



## MCI Files Antitrust Complaint vs. Bell

CHICAGO — MCI Telecommunications Corp. has filed an antitrust complaint against AT&T charging AT&T and its 24 operating subsidiaries have "exploited control of local telephone exchange service in order to prevent MCI from competing fairly and fully with AT&T's own long lines department."

The complaint was filed in the U.S. District Court for the Northern District of Illinois and cited "numerous exclusionary actions taken by AT&T to prevent MCI from implementing orders received from customers." MCI claimed that AT&T "directed its local operating companies to sidestep the FCC order" requiring local loop facilities, "through discrimination and delay ... and absolute denial" of the required facilities.

MCI did not seek specific damages, indicating the exact amount would be based on proof at a trial which was requested.

An AT&T spokesman said: "While we have not received a copy of the complaint, we are amazed that MCI thinks there are any antitrust violations."

## Service Firm to Countersue On Patent Infringement Claim

OTTAWA, Ont. — The battle lines are drawn and the legal battle is about to begin over Xoma Ltd.'s patent on an accounting system [CW, Jan. 24].

Systems Dimensions Ltd. (SDL), a remote computing and service company, recently became the second organization to be sued by Xoma for patent infringement. SDL has rejected that claim, and plans, instead, a counterclaim to gain a declaration from the Federal Court of Canada that all claims on the patent are invalid.

SDL contended that the particular programming techniques for which the patent was granted "have been in use for many years prior to the date of the filing" of Xoma's application for patent. Neither SDL nor Liquid Carbonic Corp., an SDL client and codefendant, is using Xoma's software, an SDL spokesman said.

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# 3330-Type Drives Linked to PDP-11; One User Expects to Save \$9 Million

By Don Leavitt  
Of the CW Staff

CHERRY HILL, N.J. — Nine million dollars is the estimated savings one user will have by linking 3330-type disk drives and a rash of other peripherals to DEC PDP-11s, rather than to IBM 370s, with support from an independent company, Formation, Inc.

The user — a major corporation with several physically separate but inter-related operations centers — will ultimately have 10 separate multiprocessor clusters of PDP-11/45s, with sometimes three but more often four processors at each site.

As many as 24 IBM 370/135s, costing \$13.5 million, would be needed to do the work that will be handled by these systems, which cost about \$4.5 million, Formation said.

Although developed to meet the needs of one particular customer, the PDP-11 systems can be put together and tailored to others' specifications as well, a spokesman said. There are already a handful of other users, he added.

### Mix of Peripherals

The first of the multiprocessor systems was delivered last August. The peripherals include ISS 7330 disk drives, Telex 4320-style tape units, IBM 1402 card readers and CDC-developed Telex line printers.

The ISS 7330s are normally formatted in a sectorized file organization, the For-

mation source noted, but there is an IBM compatibility mode under which records can be written/read in patterns that can be transferred directly to/from 370 equipment. Mode is controlled by a command language entry.

The configurations were designed primarily to handle data base/data communications operations including service order processing, inquiry access to each site's basic files, and — eventually — ad-

ministrative message switching between the individual locations.

The systems are essentially self-standing but Formation has devised memory-to-memory linkups so that larger corporate-level mainframes can access the data bases at the local sites. Within each cluster, one of the minis serves as a communications front-end processor, another as a disk/tape processor, and the third (and fourth)

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# FBI Wants More Control Over Crime Systems: GAO

By E. Drake Lundell Jr.  
Of the CW Staff

WASHINGTON, D.C. — The FBI is apparently involved in a power play within the Justice Department in order to centralize its control over all nationwide computer/communications systems used for law enforcement — even though many other responsible agencies have recommended against FBI control.

And, at the same time, the FBI seemingly has no idea how state and local police agencies are using its Computerized Criminal History system which the FBI obtained from Project Search in a similar power play three years ago, the General Accounting Office, the congressional

watchdog agency, said last week.

These points were contained in a GAO report prepared for Sen. Sam J. Ervin's (D-N.C.) Senate Subcommittee on Constitutional Rights, which opened two weeks of hearings here on the protection of privacy in computerized criminal history systems.

Apparently, the report noted, the FBI is now attempting to gain control of the National Law Enforcement Teletype System, (NLETS), set up in 1966 by the states and run by a nonprofit corporation for the states, in addition to its control over the National Crime Information Center network.

NLETS is used to transfer information between various states, particularly in such areas as driver record checks, prisoner transfers and all-point bulletins — information not presently contained in the huge NCIC data bank.

That data bank has grown to 4.5 million items of which 450,000 are criminal histories but the system is projected to have eight million criminal histories out of a total of 21 million records by the end of this decade.

### Kelley's Move

One of the first acts of FBI Director Clarence M. Kelley last July was ap-  
(Continued on Page 2)

# VS Development Language Code To Stay Secret, Share Group Told

By Edward J. Bride  
Of the CW Staff

HOUSTON — More than 1,000 users turned out for a Share meeting here last week at which IBM rebuffed a request to release the source code for the tools used to develop virtual operating systems.

Users who wish to modify the systems software on the virtual systems feel they are being hampered by IBM's refusal to release the tools for their use.

At issue specifically is the Programming Language for Systems (PLS), which has reportedly become a standard internal tool at IBM in developing operating systems.

PLS has been used in developing OS/VS2 and 2.2 as well as TSO and other advanced operating systems, according to users who are part of a Share (the large IBM user group) project group aimed at reversing IBM's present policy.

The attendees at the PLS project meeting heard one user say he cancelled an order for a 370/158, partially because of this attitude on the part of IBM.

However, one user on the panel defended IBM, claiming users should not tamper with IBM code, but rather pressure IBM to make needed changes.

And Robert Burchi, project administrator for PLS at IBM reportedly told the 1,000 attendees that there would be no change in policy regarding the present PLS.

The reason he gave for IBM's secretive

policy was that PLS is "proprietary," users at the meeting related.

One user said that by protecting the source code for operating systems, IBM could protect itself from competition by independent software companies attempting to sell application packages. But another attendee remarked that PLS was  
(Continued on Page 6)

## John V. Atanasoff, DP Pioneer — Part I

# Recognition ... 35 Years Late

By Georgia G. Mollenhoff  
Special to Computerworld

History is being rewritten in the computer industry as the result of a decision handed down in U.S. District Court in Minneapolis last October. Textbooks and other literature touching on the digital computer will have to be updated to credit a retired architect who was not sure himself of the scope of his contribution. This series profiles Dr. John Vincent Atanasoff, finally acknowledged as the author of the electronic digital computer, who can now take his proper place beside Edison, Bell, Eli Whitney and others who have shattered technological barriers.

Recognition more than 35 years after

his initial work on the theory and development of a computer while a professor at Iowa State College is admittedly gratifying to Atanasoff, but he insists he feels "very little" bitterness toward the man with whom he discussed his idea in great detail and to whom he gave access to all his papers while entertaining him as a guest in his home. Since 1950 that man, Dr. John Mauchly, has shared patent rights with Dr. J. Presper Eckert on the Eniac and they were believed to have originated the concept for the digital computer. Not so, decreed Judge Earl R. Larson of Minneapolis in a lawsuit to which Atanasoff was not a party but called as an expert witness.

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## Justice Begins Fight for Its Privacy Bill

# Saxbe Wants Control of Crime Records in His Hands

By Molly Upton  
and  
E. Drake Lundell Jr.

Of the CW Staff

WASHINGTON, D.C. The Justice Department began its fight last week for a Nixon Administration version of a bill designed to protect personal privacy in computerized criminal history records.

In the opening round of hearings on criminal justice data banks before the Senate's Constitutional Rights Subcommittee Attorney General William Saxbe strongly defended the administration-backed bill on the use of such records that would leave control of the systems firmly in his hands and not in a separate board as suggested in a similar bill introduced by Sen. Sam J. Ervin (D-N.C.), who heads the subcommittee.

Saxbe also backed the administration's bill on the subject of dissemination of records that do not contain convictions. The bill permits such dissemination under the direction of the attorney general — a

practice that would be banned by the tougher Ervin bill.

"Part of the citizen's right of privacy is lost through engagement in criminal activities," Saxbe contended, adding that "the facts of his arrest, trial and conviction are all matters of public record."

However, Ervin, in opening the hearings, noted that in recent years thousands of persons have been arrested for demonstrations and other political activities and they have never been tried nor have they had the charges dropped. Thus, Ervin said, the mere fact of arrest did not prove them guilty of criminal activity.

Gov. Francis Sargent of Massachusetts severely criticized the Saxbe-backed administration proposals for centralization of the record-keeping under the attorney general.

"In the long run, I believe the danger lies not in the dramatic adventures of the Watergate, but rather with the more persistent centralization of power in the Federal Government," Sargent contended.

Many police agencies, Saxbe noted, are disturbed over the fact that the Ervin bill would require sealing of criminal offender information after a five-year time period, but he said they could live with the more liberal provisions in the administration bill which calls for sealing of records after seven years — even though he suggested

no record be sealed before a person is 30 years old.

Saxbe also admitted he had not given much thought to delegation of authority for running such systems, if the Congress goes along with the administration request to put him in sole charge.

Sen. Charles Mathias (D-Md.) indicated he supported the idea of a special board to oversee the operation of such systems because "information is power and in my view concentration of power in the Federal Government is to be avoided."

Strong support for the separate board also came from Clarence A.H. Meyer, attorney general of Nebraska.

"I believe it can be said that law enforcement does not care if no one outside the family has access. And I know that

law enforcement would welcome help in limiting access," he said.

"The pressures are so great from some who have been receiving criminal history information that law enforcement standing alone cannot resist those pressures," Meyer told the senators.

An agency receiving criminal offender information should be required to ensure its accuracy and completeness, he added.

Sen. Barry Goldwater (R-Ariz.) indicated the nation is at a turning point as far as the protection of privacy is concerned.

"Privacy must be planned beforehand," he said, adding that "it is for us to determine today just how much freedom shall remain for the individual in the future."

## FBI Wants to Extend Control Over Crime Systems, GAO Says

(Continued from Page 1)

parently a move to take over the operation of NLETS and integrate it with the NCIC network of terminals, according to the GAO report.

At that time, the Department of Justice's own legal counsel indicated the

Bureau did not have legal authority to take over the network — but Kelley persisted, resubmitting his request to Attorney General William Saxbe in January of this year.

The Law Enforcement Assistance Administration, which has funded much of the NLETS equipment, strongly opposed the move, arguing that the states are fully capable of running their own network and that NLETS went to non-police agencies such as courts and correctional institutions with which the FBI should not be involved.

In the case of the Computerized Criminal History system, the GAO report noted a similar situation occurred.

LEAA's Project Search spent almost \$4 million proving the feasibility of such a system — but strongly recommended that the states run it with only a central index at the federal level — not under FBI control.

While LEAA and the Office of Management and Budget recommended the FBI not be given control of the CCH system, the FBI was able to talk then Attorney General John Mitchell into giving it operational control of the system — which the FBI quickly expanded from a federal index to a federal data bank of rap sheets, the GAO reported.

But even though the FBI has now had control over the system since 1970, the GAO report said "data is not available to indicate how computerized criminal history information has been used."

Therefore, it is impossible to tell whether the information has had any value or not, the report suggested.

## Access to Mass. Crime Histories Found Not Completely Restricted

BOSTON — Despite Sen. Sam J. Ervin's (D-N.C.) high praise for the Massachusetts law protecting privacy in computerized criminal history systems, the measure has failed to completely restrict the dissemination of such information.

Ervin told Sargent at hearings in Washington last week that the Massachusetts law governing criminal offender records is "as fine a system as there is in the field."

To date, the Massachusetts Criminal History Systems Board has authorized dissemination of such information to some 70-odd federal and state agencies, while it has closed access to 104 more.

The problem, according to an aide to Gov. Francis Sargent, is that the state legislature and Congress have been "lax" in writing laws and have passed many laws authorizing agencies to have access to the files.

The law protecting privacy of such information limits its dissemination to criminal justice agencies and others that are authorized to receive such information by specific state or federal statutes.

All of the 70-odd agencies that are allowed some access to the system are authorized either as criminal justice agencies or by specific statute, the spokesman for the governor's office said.

But at the same time, the state is taking definite steps to limit that access to the specific purposes outlined in the legislation authorizing the agency to receive criminal history information, he explained.

For example, the U.S. Civil Service Commission (said to be one of the most lax agencies on the federal level in protecting the privacy of its files) is authorized by a federal law which says that anyone convicted of a felony within five years is not eligible for civil service appointment.

But while Massachusetts will comply with this law it will only do so in the most limited circumstances and does not allow the Civil Service to see the files or go on fishing expeditions in them, the spokesman said.

If the Civil Service Commission asks the state whether an individual was convicted of a felony within five years, it will receive a yes or no answer to the question and no further details, he added.

"If the person has a number of misdemeanor convictions or was convicted of a felony over five years before, the answer to the Civil Service request would be 'No, there is no felony conviction within five years,'" he said.

But the real answer to the problem would be more restrictive legislation at both the federal and state levels, the aide said.

"Legislators have to realize that they shouldn't just authorize the number of agencies they have to receive such sensitive information," he said.

On the other hand, the law has significantly cut down on the number of people who routinely can receive criminal history information, he said.

All of the 104 agencies or private firms that have been denied access, previously could see the files of persons arrested for crimes.

Included in this group were credit reporting firms, insurance companies and executive departments of the state and federal government, he said.

## 3330-Type Drives, Mini Linked

(Continued from Page 1)

as application program handlers.

All the units in the cluster are connected with interprocessor channels built by Formation. The company also developed all the disk, tape and communications controllers, a spokesman noted from company headquarters at One Computer Drive here.

Each of the disk/tape processors can have two hardwired disk controllers. Each controller is capable of managing up to 16 spindles, he added, but there are only six spindles on even the largest configuration put together to date.

Formation also built a device it calls a Data Path Switch, which allows the input and output from the disk processor to be controlled by one processor but to operate in or out of the memory of another in the same cluster on a dynamic basis.

The DEC-supplied Unibus is capable of handling more than 2M bytes of data simultaneously. The Formation-designed system with both disk controllers operating at once will be running 1.6M

bytes through Unibus, "plus a few other things at the same time," so the Formation spokesman sees no problem in utilizing the high-speed disks.

Although the user is also using DEC PDP-11/05s — with Formation-supplied tape and disk handlers and DEC's RSX-11B operating system — to link second-generation mainframes and the Telex "fourth-generation" peripherals, the multiprocessor clusters have user-written control software.

Dividing the overall data processing function between the processors simplifies the control software needed in each, but managing the interactions between the processors adds its own level of complexity to the systems, Formation noted.

In any case, the modular approach with multiple minis will allow controlled growth in the specific areas where it is needed. Since minicomputers are "probably the least expensive part of the whole configuration," the Formation source argued, "subdividing the tasks isn't a bad idea."

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## Open Around the Clock

# Automated Bank Plan to Serve Customers of 15 Institutions

By Don Leavitt  
Of the CW Staff

BELLEVUE, Wash. — An automated banking facility shared by 15 mutual savings banks and savings and loan associations in this area will be open to customers of the institutions around the clock, starting in early May.

All the operations of the new facility — called The Exchange — will be controlled by individual customers using cash dispensers and other machines activated by a specially designed magnetic stripe plastic card. There will, however, be a host or hostess available to show how the units should be used.

### One Step Beyond

The Exchange — now being built in the parking lot of a local shopping center — goes one step beyond banking. It includes an automated post office installed and maintained by the U.S. Postal Service.

The services provided by The Exchange will be extended in another direction as well. Once the cards have been distributed (to some 50,000 customers) holders can transact business at any of the member institutions' locations during normal business hours, regardless of the institution at which the card holder is a regular customer.

The Bellevue project initially will allow deposits, withdrawals, cashing of checks and payments due one of the institutions — a monthly loan payment, for example — or payment to participating public utilities.

### 18-Month Study

The Exchange has taken form after 18 months of study by a committee of potential member institutions, headed by Gerald J. Pittenger of Great Western Union Federal Savings and Loan Association.

The objective of the cooperative effort was to research the technology of electronic financial transactions, equipment and services as they might apply to savings banks, savings and loan associations, and other members of the thrift industry, Pittenger explained.

Market research was conducted by Richard P. Yanak & Associates of Seattle. Yanak's first study confirmed the findings of many similar projects: the public was "not very excited" about the prospects of automated banking. "Too many people have had bad experience with coin-operated vending machines," Yanak surmised, "and they don't want any kind of hassle with their money."

### More Hours Sought

The study showed, however, that the banks' customers were clearly interested in extended hours of banking services, including the possibility of around-the-clock availability.

The savings accounts offered by The Exchange members were generally for long-term projects and the customers told

Yanak they felt a need for their bank's personal attention to their needs. That is what led to the posting of a host or hostess at The Exchange, along with all the electronic equipment, Yanak noted.

The experiment has far-reaching potential for the participating banks and savings and loan associations, he added. If The Exchange can handle the utility payments properly, for example, it could lead to a statewide linkup with merchants, with appropriate card reading/updating units installed at the points of sale.

If the transactions for the various financial institutions are properly handled, Yanak went on, the result may be a statewide automated clearinghouse operation for savings banks, something most regulatory agencies have not yet allowed even though the savings banks have sought the capability for years.

## Single Off-Line Unit Controls Operation

SEATTLE — The Exchange facility in the Bellevue, Wash., shopping center, which 15 financial institutions will be sharing later this year, is equipped with a single Tabs 500 (Total Automatic Banking System), according to Gerald Pittenger of the Great Western Union Federal Savings and Loan Association.

A member of the committee that planned the Bellevue Project, Pittenger added that the unit, built by Diebold, Inc., will be used off-line initially, although it will likely go on-line to a central CPU if the experimental operation works out well.

There is a mini inside the Tabs 500 to monitor the customer's instructions as transactions are entered. In "off-line" mode, mini-generated paper copies of transactions for the individual participating institutions would have to be sorted and distributed manually. The central CPU — if The Exchange finally goes on-line — will have

greater power to work directly with the computer systems of the individual institutions, Pittenger noted.

Displayed at the recent Mutual Savings Bank conference in Philadelphia, the Tabs 500 can be used with the Transmatic programs developed by the Savings and Loan League to allow interaccount transfers and preauthorized payments so that a customer can shift money from savings to make a mortgage payment, for example.

The unit also supports simpler transactions, including both deposits and withdrawals by authorized users of specially encoded magnetic striped cards, carrying the thrift industry's standard third track of information that can be updated with each use of the card.

The Tabs 500 will retain cards that it determines to be unauthorized, after comparing their encoding with a predefined "hot file" of target cards.

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## Library Co-op Formed

NEW HAVEN, Conn. Yale, Harvard and Columbia universities are cooperating with the New York Public Library on a computer plan designed to give scholars and researchers better access to their combined library resources.

The proposal calls for adoption of the Marc II format developed by the Library of Congress for coding and tagging all segments of bibliographic records, which would make it possible to produce a computer-based microform catalog of the collections of all four libraries. Research for the system, which eventually will be on-line, is being handled by the Bibliographic Center for the Research Libraries Group at Yale.

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# Remote Job Entry May Be Best For Smaller Shops, Branches

By Toni Wiseman  
Of the CW Staff

HOUSTON — How does a user determine whether he should have his own CPU or go to remote job entry (RJE)? Steve Veselka, director of program and project planning at Houston Lighting and Power Co., provided some points to consider in answering that question, especially for smaller installations.

Small shops have many limitations



which a service bureau, accessed by remote terminals, could not share, he said. For instance, a small shop probably cannot afford a large memory, yet it may be required to run certain jobs.

"A small shop cannot afford the money which needs to be spent to optimize that shop, yet a big shop or service bureau has to optimize, so let them do the jobs which are messing up your turnaround time," he said.

Financial considerations include the costs of paper, site preparation, floor space, utilities and possibly maintenance, he said.

"If you go outside," he said, "there are also nebulous expenses such as travel to and from a data center, the cost a service bureau will charge you for I/O, etc."

"You simply have to take a mature financial look at your situation," he concluded.

Remote job entry may also be the solution to the problems of companies with several widely dispersed offices. In this case, he said, the DP function could be centralized in one location while the others use RJE terminals.

Specifically, Veselka said, there are four key areas for consideration.

## Initial Considerations:

- What do I need from RJE?
- What can RJE do for me?
- What are the alternatives to RJE?
- What will be the input to the in-house computer?
- If running to an external computer, where are the system support people located?

## Determine Basic Requirements:

- Do I need the capability to connect to one or to multiple manufacturers' computers, i.e., IBM 370, Univac 1108, CDC 6600, etc.?
- What equipment do I need with the RJE terminal?
  - Card Reader — what speed?
  - Printer — what speed?
  - CRT console, teletypewriter console, no console
  - Card punch
  - Magnetic tape
  - Disk
  - Cassette deck
  - Plotter
- Do I need off-line capability?
  - Card-to-print only.
  - Card-to-print plus data validation.
  - Computing power for small jobs plus RJE capability.
  - Card-to-punch.
  - Other capability.
- How much data do I need to move?
- If I choose RJE, do I want a closed shop with operators, or do I want an open shop with the equipment available to users?

## Selecting the RJE Equipment

- Will the terminal meet the basic requirements?
- How much noise does the terminal make and can we live with it?
- What is available in communications and at what price? What is delivery time for the communication lines and equipment compared with terminal equipment?
- Is maintenance available and in what time frame for each terminal under consideration?

• If considering a programmable terminal, what support is available if a program fails or has a bug? Who furnished the software and where are they located? Do I need the capability to write my own programs which will run the RJE terminal memory? What is the cost of this option?

• What is the growth path, i.e., as load increases, how can you handle it?

• What training will be required in connection with the RJE terminal?

For operating the terminal?

For programmers using the terminal?

For your own DP center operators?

• How many devices will operate simultaneously on the terminal?

• Look carefully at the reliability of the card reader and printer and the ease of use.

• What are the air conditioning requirements for the terminal?

• What pricing options are available (i.e., one-, three-, five-year lease, purchase, etc.)?

• Consider the total price of the terminal including all hardware, software, communications and supplies in making your economic evaluations.

## Delivery and Installation:

- What is the source of supplies? Don't forget to have ribbons, cards and paper on hand when the terminal is delivered.
- Where will supplies be stored?
- Does the terminal require an emergency Stop (panic button) to kill all power?

## University Accounting Starts It All

# On-Line Inquiry System Grows and Grows...

By Patrick Ward  
Of the CW Staff

CINCINNATI — When the University of Cincinnati (UC) received a large amount of funding from the State of Ohio in 1967, the municipally owned school was required to produce periodic reports detailing how the money was being spent.

This requirement turned UC toward an on-line accounting inquiry system, said Dr. Robert Caster, now director of the Southwestern Ohio Regional Computer

## Caravan Attendance Up

HOUSTON — At the end of its third stop here last week, more than 8,500 had attended the Computer Caravan's traveling exhibition and forum, with every city on the tour registering higher attendance figures than the comparable city last year, according to Edward Bloom, registration manager.

Washington showed dramatic increases with 73% more attendees at the forum sessions and an even greater increase overall, Bloom noted.

The Caravan, which is taking a one week break this week, will travel on to Anaheim next week and San Francisco the following week.

Center (Swozee) at the university.

UC has a \$120 million budget, 120 departments and 35,000 students. Caster said at a Computer Caravan forum, Swozee is UC's central computing facility, but shares its 3M-byte IBM 370/165 with other nonprofit users in the area.

The on-line accounting inquiry system began in 1967 was the first of several applications that now include on-line payroll, personnel and hospital accounting inquiry systems, and on-line student admissions and registration.

A total of 200 on-line terminals including 30 IBM 3270s, access the university's files, Caster said. The university developed its own data base management system, organized around the Social Security number, to tie its files together and avoid duplication.

The accounting application begun seven years ago now helps the school keep track

## Shared Key-to-Disk 'Works for Him'

HOUSTON — Where data entry is concerned, users should not "copy other shops just because a system works for them." Select equipment that will solve your particular problem, a group of DP managers was told at a Computer Caravan workshop here.

Jack Haigh, DP manager at the Mesher Steel Co., said his biggest problem in data entry was sheer volume, so this is the area he attacked. Haigh found that nine keypunch operators and a supervisor simply could not handle the volume of input.

By turning from a 370/135 to third-party leasing on a 360/40, doubling his core to 192K, and adding two disk spindles and tapes, Haigh said he was able to trim enough off his monthly operating costs to cover an investment in new data entry devices.

Haigh has implemented a shared processor CMC key-to-disk system. The mini cluster, which is an on-line system with five CRTs (though it could handle eight) preedits data, transmitting it in 2780 emulation mode to a Datapoint 2200 system.

The CMC system includes a 16K mini with dual modes of operation — the foreground which controls terminal

interaction and the background which handles all service functions, including communications. This mini controls 10 key entry stations.

Five Datapoint 3360 CRT terminals are hooked up to a Datapoint 2200 mini with two disk drives. This mini communicates with the CMC system via Bell 201 modems.

Currently, the Datapoint mini is located in the accounting department, Haigh said, and three tubes are also being installed there. Two more tubes are being installed in the treasury department, while the CPU and key-disk equipment remain in the DP area. Although operating at the same location, the CMC and Datapoint systems communicate using modems to simulate a link to a remote site, Haigh said.

The philosophy behind this equipment distribution, Haigh explained, is that he is trying to get the data entry function back to the user department. This move, he said, is justified by the savings realized in reduced handling, and a drop in error rate resulting from the fact that the user is familiar with his own data and therefore is more likely to spot an error.

• Are there any special requirements for RF grounding with the terminal?

• Who pays the freight for delivery and removal?

• Who is responsible for the terminal while it is in transit?

• A keypunch machine is required with

a terminal?

• What are the power requirements?

• Diagram the room that will house your equipment for efficient initial placement. It is usually more difficult to move the equipment after it has been installed. Many vendors will charge to move equipment after initial installation.

of 70,000 transaction/mo. There are files on budget, fund balance, outside encumbrances, vendor information, bank balance and construction.

The university originally used IBM 2260 video terminals accessing a 360/40 for the application, but has since switched to 3270s.

The university's next on-line application was a payroll inquiry system, Caster continued. UC administers payroll for Cincinnati General Hospital and handles paychecks for a total of 17,000 persons each month.

## Security Questioned

What security measures protect this data? attendees asked.

Each terminal's address is the first security provision, Caster said. For example, only terminals in the payroll department, and not those in the personnel department, can make payroll inquiries.

There are also daily codes, file codes and the correct Social Security number itself to protect records.

The terminals are also monitored for time of use. This technique once caught a janitor trying to use a payroll terminal after five p.m., Caster stated.

But what about your analysts and programmers? attendees asked.

This is a more difficult problem, Caster admitted. But even systems programmers who wanted to get at such information would have to take the risk of dumping data on a printer while a DP administrator was nearby.

"They would be severely reprimanded if found doing it," Caster added. UC's next application was a personnel system developed in 1968 which can furnish information to the government on how many persons in a certain category work for the university, their length of employment, salary level and other data.

In 1969, the university utilized IBM's Shared Hospital Accounting System (Shas) for use at Cincinnati General.

The 200 program package was written for DOS, and converting it to OS took six people six to eight months, Caster stated.

The system handles about 66,000 records and 10,000 transaction/mo, Caster

noted, and has saved the hospital "\$100,000/yr" through improved bill collection. The hospital uses IBM 2741s rather than CRTs for on-line inquiry. Updates are batched.

## First Data Entry

The university's first use of on-line data entry came in 1969 with the admissions system. This department faced 16,000 to 18,000 applications yearly and was mired in paperwork, Caster related.

The department was separate from other application areas and its director was eager for a new approach. He went so far as to allow three of his clerks to work at data entry — a rare concession from a department manager, he observed.

Numerous benefits have accrued from the change from a totally manual to a totally computerized approach, Caster said, and one reason is that the user is responsible for his own file updates.

The next application to go on-line was a grants and contracts system which helps the three persons in that office keep track of \$17 million in funds a year.

UC's president has his own terminal accessing his private files, Caster said. The university's president was new to the area and wanted an information file to acquaint him with the community and its people.

The result was an index sequential file with 17,000 records on 7,000 persons.

The file lists names of local lawyers, for example, and then branches off to individual biographies.

Student registration is another on-line data entry application. Most students are already preregistered through use of a leased OCR device.

Those registered on-line benefit from knowing for certain what classes they are in and what their schedules will cost, Caster said.

Swozee uses CICS but Caster said he is "very turned off" by it. It uses 600K, he said, and two months ago it had been up to 750K.

However, there were mitigating factors, including the fact that Swozee wanted its CICS written in PL/I, an uncommon choice.

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## Dairymen Keep Track Of Cows' Milk, Health

ONTARIO, Calif. Sy Vander Dussen here is just one of 1,000 California dairymen using computers to help increase milk production and upgrade the quality of their dairy herds.

Vander Dussen uses a system that tells him just how much milk each of his 450 Holstein cows produces in relation to his herd's and the state's dairy averages. In addition, the system keeps a close check on each cow's condition.

Sponsored by the State Agriculture Extension Service, the system combines the DP talents of several private companies and universities. Annual reports and efficiency studies are generated by a Burroughs B6700 computer run by the University of California at Davis, among others.

Records used by dairymen in day-to-day management of farms are compiled primarily by two private companies, DHI Computing Systems in Utah, which uses an IBM 360, and Agritech Analytics in Tulare, Calif., where an IBM 1130 is used.

Once each month, experts

from the Dairy Herd Improvement Association, a nonprofit group working under State Agriculture Extension guidelines, visit Vander Dussen's farm. There, they take samples of milk produced, and examine each animal for health and breeding status.

Information is mailed to the computer center in Tulare. Printouts with compiled results are mailed back to the farm within a day.

"I can tell at a glance how each cow in the herd is doing," commented Vander Dussen.

## Share Group Told

# Development Language to Stay Secret

(Continued from Page 1)  
used only in developing systems software, not applications.

Burchi reportedly remarked at the meeting, which was not open to the press, that when an updated version, PLS-2, is available, IBM could reconsider its policy; but this was apparently the only possibility IBM was willing to consider.

One attendee said this uncertainty is "just a big stall."

Burchi also reportedly contended that PLS was not needed in order to permit operating

system modifications, but users attending the Share meeting disagreed. One user from one of the large Southern universities said PLS was "almost necessary" for most shops.

Reacting to a suggestion that only advanced computer installations dare modify operating systems, the user retorted, "Most OS shops have their own local [modifications]." and the same could be true of the virtual shops if the PLS were made available.

The controversy has apparently

been brewing for about two months, since a user requested the PLS source code from IBM and got a "non-answer" in a letter from Burchi.

User sources indicated the "non-answer" was a claim that the firm was looking into the possibility of making the code available.

However, this will apparently not even be possible until PLS-2 is complete, while the users at the Share meeting appeared more concerned about modifying OS/VS-1.

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## Blue Cross Operators Denied Bargaining Unit

NEW YORK — Computer operators for Blue Cross of Greater New York have lost their bid to be recognized as a separate bargaining unit among the organization's 2,500 clerical employees here.

The National Labor Relations Board accepted the company position that all 2,500 Blue Cross workers, and not the 88 computer operators, formed the appropriate bargaining unit, according to Peter Petino, spokesman for the operators.

"We felt we were separate as far as working conditions [were concerned]," said Petino. "To me it's a slap in the face when the company considers you as a clerical worker rather than a technical man," he added.

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# New Checkout Systems Anger Consumer

By Toni Wiseman  
Of the CW Staff

NEWTON, Mass. — Now that computer-based supermarket checkout systems are a reality, consumer opposition and demands that consumer needs be considered are springing up.

Many bugs still need to be ironed out, despite the seven or so years of testing which have gone into the systems, according to a consumer advocate here. Consumers, in her opinion, should have been consulted in the planning stages — but they weren't.

In these systems, item prices are marked on the shelves, but

the products themselves are marked only with a standard product code which is optically scanned at the checkout stand. The system automatically adds the cost of the item to the customer's bill by accessing a file of prices stored in the computer.

The legality of the supermarket systems has yet to be tested, the consumer indicated, an eventuality which she feels could well arise.

"If the system should fail a court test for some reason after all the equipment is installed, what a waste of money," she said, indicating that the situation might have been avoided if con-

sumers had been in on the earlier planning.

The consumer, who wished to remain anonymous because of annoying letters she has received in the past, said she spoke for hundreds of women in their areas of concern.

## Removal of Prices

One of the major problems is the removal of prices from packages. This, she said, will in many cases eliminate the possibility of comparison shopping, a mode many shoppers have been forced into in the last year or so by spiraling prices.

"Once you take a box off the

shelf and turn your back, you no longer have any idea what that item cost," she stated. "And since most stores have their 'specials' set up at the end of aisles, you'd have to run back each time to check if it really was a good buy."

In addition, there is no way of telling whether the person who posted the prices on the shelves marked up the up-to-date ones. "Human error is great. Even today in almost any supermarket you can find two identical cans of juice, for instance, with different prices. And when the prices are changed within the machine itself, you'll never

*"Once you take a box off the shelf and turn your back, you no longer have any idea what that item cost."*

know if there is a mistake," she said.

## How Much Left

Consumers will also have to change their way of shopping in terms of the amount of cash they carry. Many people today bring a fixed amount of money, say \$10, with them. Now, the consumer spokeswoman said, you can no longer look down in your cart and see how close you are to that amount of money.

"This is like sticking the housewife's head in the sand," saying, "listen, bring your blank check, get what you need and that's the way it is because prices are going up and we're going to help you out by not frustrating you by showing you the rising prices."

Another complaint, she said, is that a shopper can no longer look in the refrigerator and know whether to give Johnny 50 cents or \$1 to go buy a pound of butter.

Furthermore, the shopper can no longer look at last week's box of cornflakes and see how much it had gone up this week.

## Useless Data

"Only about one out of 30 shoppers checks his register tape with packages now, so the added information the computer will give him or her is really useless from the consumer's viewpoint," she stated.

The laser beam used to read the Universal Product Code is another area of concern. Will it have any effect on the food?

"This isn't a once in a while thing," the spokeswoman said. "Every item of food that goes into your body will be exposed. Maybe the laser will kill bacterial growth in dairy foods, but I have to believe that different foods may be affected differently. And I haven't seen any documentation in any articles published so far."

## Who Cares?

"The idea of this thing is fine. I think it's a very workable solution to a lot of problems," she said. "But I think that they have been so interested in the wholesaler and the retailer and the manufacturers that they completely neglected the consumers and their feelings."

Consumer commissions are currently being set up throughout the Commonwealth of Massachusetts to look at supermarket systems among other things, she said. As a legal board, the commission will have more power than an irate group of consumers, and perhaps, she hopes, get some consumer input into the development of computer systems.

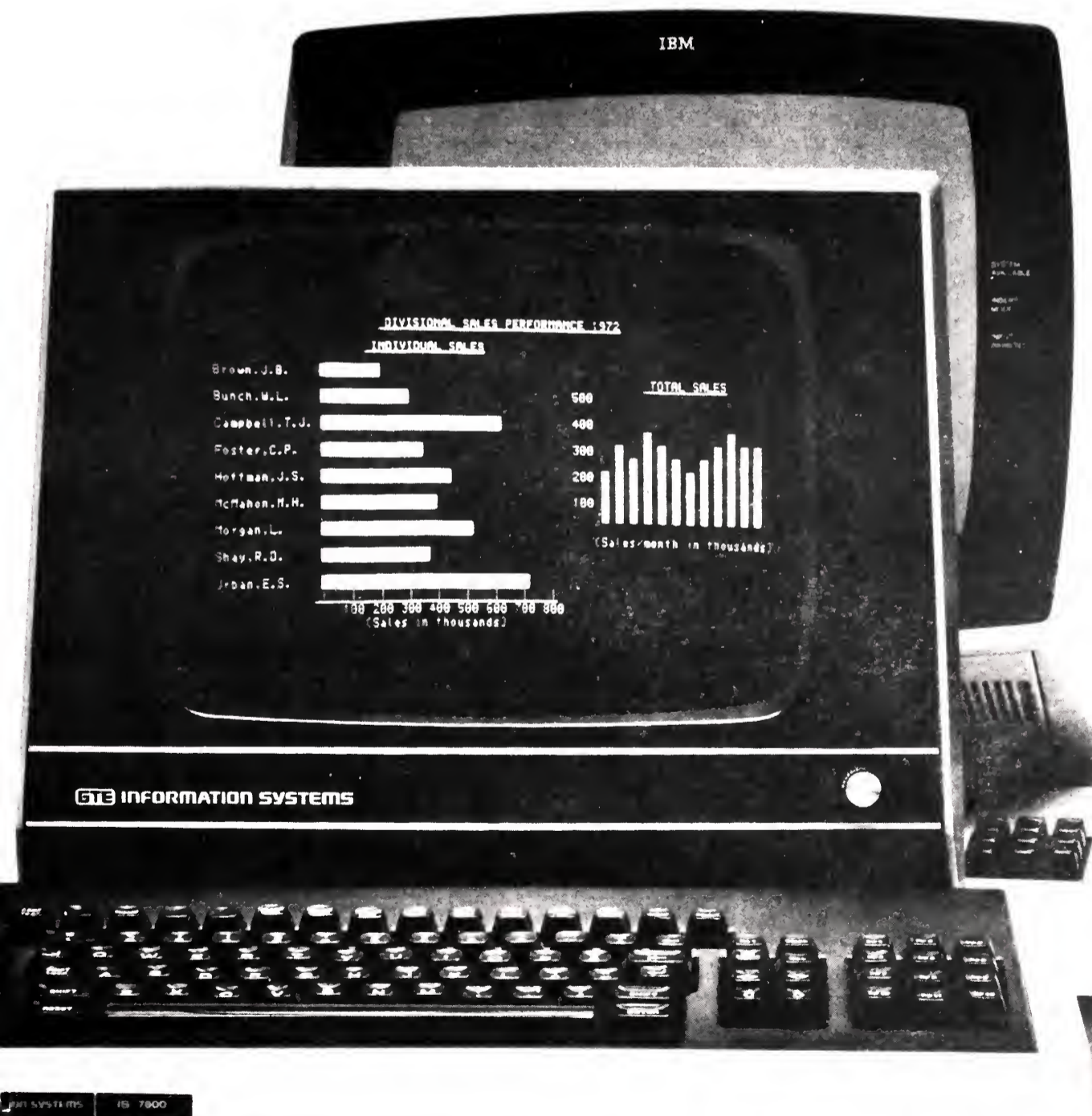
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# Koch Bill Aims to End Privacy Erosion by Government

By E. Drake Lundell Jr.  
Of the CW Staff

WASHINGTON, D.C. "Personal privacy, long a cherished right of Americans, has been steadily eroded by technological advances in the computer field and by a government that is using those computers to assemble information on its citizens," according to Rep. Edward I. Koch (D-N.Y.).

Koch, speaking at hearings on his Federal Privacy Act, which would allow anyone to inspect records maintained on him by the government, said the bill "responds to the problem that individuals face today in not knowing what government agencies maintain files on them and, most important, whether those files contain erroneous, irrelevant and sometimes unfairly damaging material."

## What Policy?

While the number of computerized files on individuals is growing rapidly, Koch said "the Congress has yet to develop a policy governing the collection, evalua-

tion, dissemination and use of this enormous material."

His bill (H.R. 667 and H.R. 12207 with amendments) "would help the individual to protect his or her own interests against abuse by government-collecting practices and would necessarily reveal patterns of government operations which are detrimental to individual liberty and thereby inhibit them," Koch claimed.

The bill provides for the following:

- Permits anyone to inspect his own record
- Permits the removal of any erroneous information.
- Allows anyone to supplement information in his record.
- Requires agencies to notify an individual any time the record is disclosed to any other agency or anyone else outside the agency maintaining the record.
- Prohibits disclosure of records or information from them to any individual in the agency unless it was necessary for the performance of their duties.
- Requires agencies to maintain a rec-

ord of anyone inspecting records maintained in the computerized file.

In addition, the act calls for the establishment of a Federal Privacy Board to supervise the administration of the provisions in the bill — and to which individuals could appeal to seek the removal of erroneous or misleading information from their files.

The seven-member board would be appointed by the President with the advice and consent of the Senate, according to the proposed measure.

A fine of \$1,000 would be levied for any federal employee who knowingly violates the provisions of the act.

Exempt from the provisions of the act would be files maintained for national security purposes and for law enforcement programs, but the President would be required to inform the Congress yearly of the number and nature of such files.

## Reexamine Old Files

One of the major effects of the bill would be to stimulate "government agen-

cies to reexamine old files and to destroy or open up those that no longer are relevant," Koch claimed in his testimony before the House Subcommittee on Foreign Operations and Government Information.

Today, "an individual does not really know who has the information about him, or how many agencies are using it, or for what purposes. He has no mechanisms for providing explanations, or to add mitigating facts," Koch said.

"The bill is long overdue. Certainly it will cause, at least initially, some inconvenience to government officials. But this is a cost eminently worth paying for the benefits of creating such a system of protection," he added.

The bill, if enacted, "would have a powerful deterrent effect on government agencies. There would be a strong new disincentive for the establishment of unnecessary files on individuals; where records are maintained, officials would treat them with more respect than presently is the case and would be inclined to weed out irrelevant, incorrect and dubious material," Koch concluded.

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## U.N. Warns Of Data Abuses

NEW YORK — The internationalization of the privacy issue became more concrete recently with a United Nations report warning that data banks containing personal information may have "dehumanizing effects" on individuals and suggesting that governments adopt rules to control the collection and dissemination of such information.

The report — drafted by the U.N.'s Human Rights Division and issued in the name of Secretary General Kurt Waldheim — suggested minimum standards to be adopted by member states to protect personal privacy in relation to such systems.

### Right to Challenge

For example, the report said, wherever possible, individuals should have the right to receive a copy of their file and the right to challenge unverified or out-of-date information or to correct inaccuracies.

It also said that prior approval of individuals should be obtained before any data is collected about them for inclusion in computerized data banks, except in cases of national security or where criminal conduct is involved.

Furthermore, the report said, data should not be collected about individuals' political or religious views, intimate life or ethnic origin except in cases that were explicitly sanctioned by law.

In any case, material of a "hearsay" nature should never be collected for inclusion in any computerized files, according to the study.

In cases where there is misuse of data in computerized files on individuals, the law should provide for compensation to those individuals, the report added.

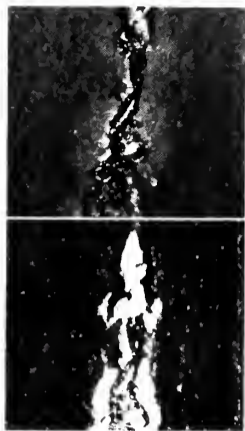
### Discussion Delayed

The report suggested formulating a standard for personal data collection, but further discussion of this subject was put off by the U.N. Commission on Human Rights at its current meeting even though it asked for comments from member states on the broad outlines of the report.

Opposition from the USSR and some African states was blamed for delay in adopting the report for immediate action by the Commission on Human Rights.

However, sources noted that the issue would be brought up again later this year, both before the Human Rights Commission and possibly the General Assembly of the U.N., where more concrete action might take place.

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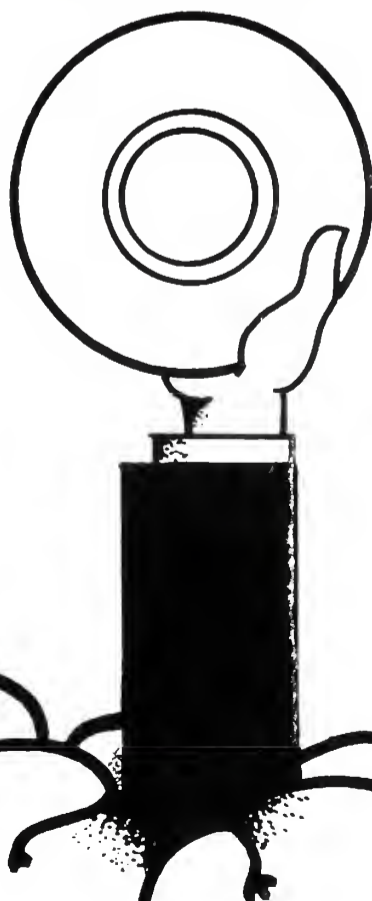
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## Urges More Sharing, Longer Leases

# GSA Chief Blasts DP Resources Waste

By a CW Staff Writer

DALLAS The General Services Administration is pushing for more sharing of computer equipment and for longer-term leases, according to Arthur F. Sampson, administrator of the agency.

"Today we face the certain knowledge that our ADP resources could be used better. And we face the frightening thought that we may be, in fact, wasting those millions of dollars" that are now being spent on computers and communications, Sampson told the recent Federal Executive Board Telecommunications Seminar.

One of the first steps in better utilization of computer and telecommunications equipment would be a better understanding of the scope of computer use in government at the present time, he indicated, calling for refinement of the present inventory of equipment.

"The government census of equipment must be used to examine the past growth of ADP resources," he said, "and it must be used to plan ahead."

A second challenge, he said, is to "improve the

ways we procure data processing resources. We've simply got to reduce the current volume of sole source, specialized 'buys' of ADP equipment and services.

"Our experience has already shown us that we can save almost 90% in buying certain computer components. And we are seeking congressional authority for multiyear leasing of computers - a step which would save millions."

At the same time, he noted a responsibility to make computers more accessible to managers within the government, but said this movement must take into account the needs of data security and the protection of personal privacy.

But even with those problems, he said "we must pursue this development. Making our ADP resources directly accessible to managers can vastly improve their efficiency."

### Standardization

A third challenge facing the government is that of standardization, he said, since "as we improve man-to-machine systems we must expand machine-to-machine compatibility. As we do that, we multiply our ability to store and manipulate data."

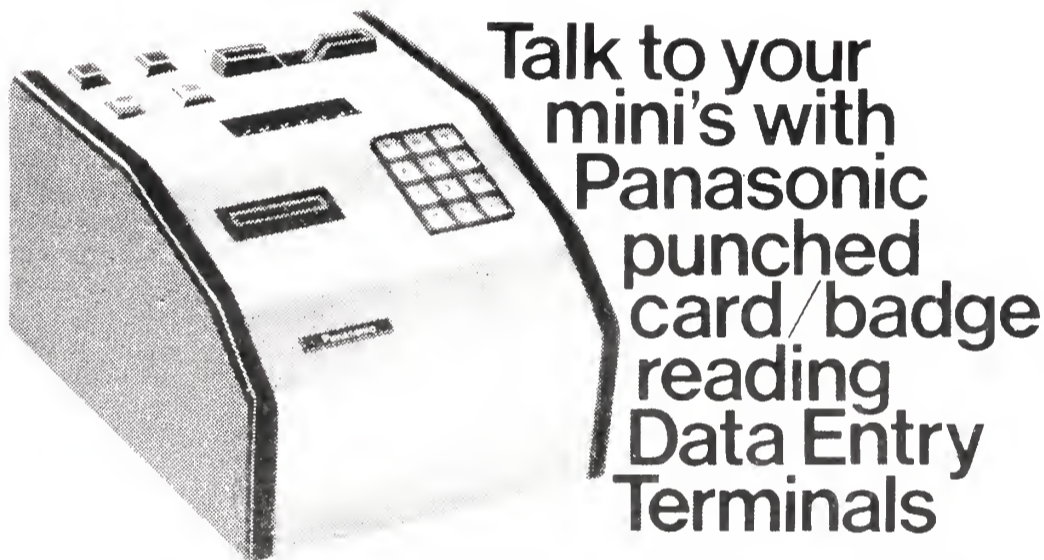
In addition to standardization, he said there was a need in the government to improve the sharing of computer and telecommunications resources.

Presently, he noted, there are 12 Federal Data Processing Centers in operation, "but, frankly, they must get wider use to fully earn their titles . . . Common use of resources determines just how productive they are."

Computer utilization in the government "has the potential to save the taxpayer millions of dollars - not to waste them," he said, adding "we should see data processing as a utility. And we should build it into an efficient and universal utility."

To make such use more efficient will take greater management resources, he said, "not computer expertise but direction from the managers at the top . . ."

"Federal managers can provide the leadership, can foster cooperation and can make necessary sacrifices. But first they must build their understanding," he concluded.



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## Cell Research Seen Aiding Astronauts

MOBILE, Ala. Scientists at the University of South Alabama here are using a computer for research which could lead to a method of monitoring the health of astronauts by detection of changes in the body's cells.

The researchers can identify a cell by scanning it with a microscope. The microscope, controlled by the computer, according to Dr. Herbert F. Longenecker, moves on a prescribed grid and digitizes the optical information that comes through as a function of wave length of light.

"We can scan the cell and find out what the gray levels are at any given wave-length of transmitted light," Longenecker said. "From that we can decide what type of cell it is - what the relative proportions of intracellular materials are - and from that we can make some decisions about the status of the cell," he noted.

Initial use of the system, he said, will relate to this type of cellular research, based on work done at Nasa by Dr. Vernon Scholes during the Apollo program.

Scholes developed the method to determine, within a few hours after infection, that the cell was infected.

"The normal time to determine cell infection was about two weeks," Longenecker said.

The researchers will also be using their Varian 73 to look at cells in the pituitary gland and at the distribution of synapses in the central nervous system to follow the healing process of various nerves.

The automated cell recognition promises to be beneficial in both research and clinical diagnosis, he said.

## It's Free for Nonprofit Use

# And Now Government Presents... Its Car Pool Plan

By E. Drake Lundell Jr.  
Of the CW Staff

WASHINGTON, D.C. A computerized car pool matching system is playing a key role in the government's efforts to minimize the energy crisis through a greater use of car pools.

The software system, written in ANS Cobol, is free to organizations that will use it on a nonprofit basis from the Department of Transportation's Federal Highway Administration.

### Funding Available

In addition, such organizations can receive federal funding to pay for 90% of the cost of operating "systems for locating potential riders and informing them of car pool opportunities," upon application to the Department of Transportation.

The program, which takes 122K of core on an IBM 360/65 and has been run on Univac and Burroughs equipment also, is already used by almost 200 businesses, state and local governments. It is presently being converted to run on Control Data equipment also.

The program basically identifies individuals who live in the same neighborhood and who work in the same general area, and can provide matchups by working hours.

Participants in the program are supplied with lists of people in their neighborhoods who might be interested in forming car pools and whom they can then contact on their own to organize the pool.

The fuel savings from car pooling can be "substantial," according to Secretary of Transportation Claude S. Brinegar, who is pushing the computerized car pool system and which he hopes will be in use by this May in all of the country's 256 urban areas with over 50,000 population.

Presently, he said, the average occupancy rate for automobiles used in urban work trips is 1.6 people per car. "If this automobile occupancy rate could be raised to 3.2 persons through car pooling - we would save 20 billion gallons of gasoline annually," Brinegar said.

"Even a very modest increase of from 1.6 to two persons per automobile would save five billion gallons of gasoline each

year," the secretary added.

He noted that motor fuel consumption in the U.S. during 1973 amounted to approximately 115 billion gallons, for an average of approximately 900 gallons for every car on the road.

At the same time, increased car pooling would also offer other advantages both to the car user and to the society as a whole, the Transportation Department noted.

For example, the Highway Users Federation estimated the cost of a typical 10-mile trip to work downtown in urban areas of over one million at \$2.64. A two-passenger car pool halves the cost, obviously - and a four-passenger pool reduces the cost per person to just 66 cents.

In addition, a family car would be free for other uses besides commuting, possibly allowing a family to reduce the number of cars owned or reducing the mileage driven so that the time between trade-ins could be lengthened, the department

noted.

Car pool programs also help to reduce atmospheric contamination, the department said. "Absolute reduction in air pollution from travel," the department said.

"The Environmental Protection Agency has determined that the hydrocarbon production between morning and evening hours is the most critical effect on daily ambient oxidant pollution concentrations. During this critical time, a carpooler's travel for work purposes accounts for 85% of total travel.

"The most pollution critical period of the day for hydrocarbons is spent with the period in which car pooling is most effective," the department noted.

### Smoother Sailing

At the same time, a reduction in the congestion on the road through increased car pooling would also allow vehicles to travel at a higher rate of speed and avoid

delays, the department said.

Available for use by nonprofit organizations, the system is also available for use by businesses and government agencies, but at a cost of \$400 per year for each computer terminal.

The program is designed to be used on a terminal basis. A typical average carpool would save an increase of 200% in fuel economy. A carpool of 4 could save 800,000 gallons of fuel and could make a difference in a car's carbon monoxide emissions, the department said.

The computerized Car Pool Matching System is available on tape, especially when a single copy of the program is needed. It is available for \$100 but must be purchased from Kevin Heenan, Chief Urban Planning Division, Federal Highway Administration, Department of Transportation, Washington, D.C. 20590.

It is also available for commercial use at a cost of duplication of \$40.

## IF THE IBM 3270 HAD INTELLIGENCE, IT WOULD BE A SYCOR 250.



And it would cost you less, too.

Because, while our new Sycor 250 does everything IBM's 3270 does and more, its monthly lease cost is lower.

And thanks to its intelligence, that's only the beginning of your savings.

Take data entry. Our 250's high I.O. insures every piece of data your operator enters is absolutely clean. So less time is spent on the line.

Which means you can install more terminals per line and probably end up needing fewer lines and ports.

Give your Sycor representative a call. He'll be happy to point out other money-saving ways the 250's intelligence can be tailored to your operation.

While you're at it, ask him about the 250's impressive optional equipment. Like the badge reader, the light pen and the whole family of versatile printers in speeds of 80 or 165 cps.

He knows it takes a smart DP manager to pick an intelligent terminal.



## SYCOR

## Migrant Patient History Automated

Special to Computerworld

SYDNEY, Australia — Migrants admitted to the Royal Prince Alfred Hospital in Camperdown here are being interviewed with the aid of a computer which compiles their medical histories before they are seen by a doctor.

The hospital is the first here to use this method of computerized interviewing. It has taken Dr. V.X. Gledhill of the Royal Prince Alfred Hospital five years to develop the system, and plans for still wider use of computers have been prepared.

"The computer could compile data and ask questions in seven languages," said Gledhill. "At the moment it has been coded with medical terms necessary to write a medical history in English only, but we hope to develop the system to obtain medical histories in another six languages, he said.

"Eventually we will be able to communicate with doctors in other countries in their own languages. I can see that one day a diabetic person for example will be able to obtain his medical history in several languages before he goes on a world trip."

By the end of 1974 Gledhill expects to have the medical history of up to 10,000 patients on tape. When sufficient information has been compiled, he hopes to "teach" the computer to diagnose and suggest further tests or treatment in simple cases.

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## Editorials

### The Privacy Promise

The National Association of Public Health Officials in the American Association of Health Administrators has issued a statement on the use of computers in health care.

Executive Order 12066, issued by President Nixon, requires that all federal agencies, including the Department of Health, Education and Welfare, must ensure that the privacy of individuals is protected in the use of computers.

At the same time, the Department of Health, Education and Welfare has issued a statement on the use of computers in health care, stating that the use of computers in health care must be done in a way that protects the privacy of individuals.

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### Impossible to Simulate

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### Right On, Robert!

ROA Chairman Robert Salomoff is not a hero in computer circles—far from it. But his recent Johns Hopkins speech was good stuff, very good stuff. He talked boldly and bravely for a strong, independent federal agency for science and technology.

Declining state and R&D support and the funding of Ed David's little administration, Salomoff needed a tank of ordnance from the OJA leaders, brass, and transportation, loaded with energy and material sources, polluted and contaminated, loaded with oil. An even more sordid affair would have been the result.

He is right in the Marina Park, the Nasa suggests. The high school program is a model of what technology can do for the future. It is a model of what technology can do for the future.

Salomoff's speech was a model of what technology can do for the future. It is a model of what technology can do for the future. It is a model of what technology can do for the future.

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'Durn Clever, These Chinese...'

## Letters to the Editor

### Let Congress Rely On Executive Systems

TO THE EDITOR: I am writing to you regarding the use of computers in health care.

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Computerworld welcomes comments from its readers. Letters should be addressed to: Editor, Computerworld, 797 Washington St., Newton, Mass. 02160.

# Court Case Finally Credits Real Father of Computers

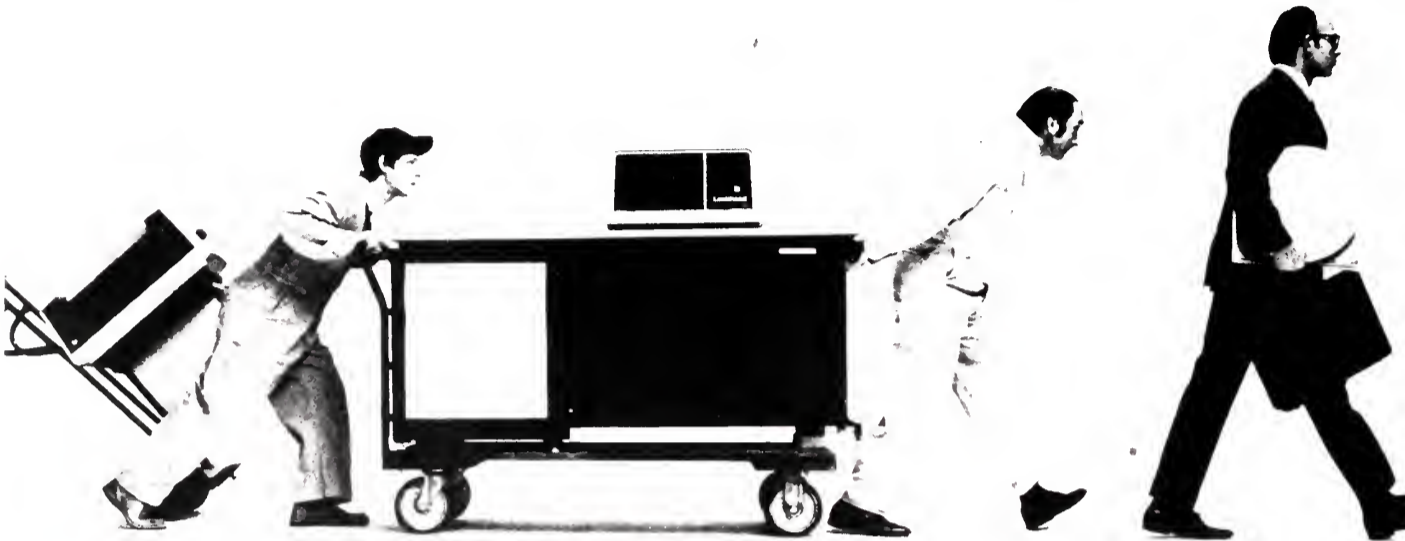
The decision will probably

Iowa State was not the only

## Position

The label on the left is the one sent to Dilks at home as a solicitation to subscribe to CW, while the one on the right came off a copy of the CW he receives at work.

## Why sell only software when you could be selling a complete turnkey system?



### The Lockheed System III

If that question intrigues you, maybe it's because you've already begun to think about expanding your business beyond software. If it doesn't, maybe you should. In either case, Lockheed has the answer to how you might go about doing it. It's called the Lockheed System III.

Why the Lockheed System III? Because it offers you a unique opportunity to supply the total needs of your customers by combining your own application software with an inexpensive, flexible, minicomputer system. A computer built by Lockheed Electronics and backed by dependable, nationwide service.

How unique? Let System III speak for itself: It has an RPG II compiler in operation with proven reliability. Others make this claim, we deliver.

You can use existing RPG II source level programs and tie in easily with new technology peripherals.

In addition to the RPG II compiler, we offer

DOS, sort/merge, assembler and utilities.

The basic configuration includes 16K bytes of memory, CRT/keyboard, 100 CPS printer and 5 million byte disk. Furthermore, System III is easily expandable without a lot of hidden cost.



And what's probably most important to you and your customers: the cost of a typical System III can be substantially less than the cost of competing systems.

One more thing.

Lockheed delivers in a hurry. So you don't have to miss a sale just because somebody missed a delivery date.

If selling turnkey systems makes good business sense to you, call us now (213) 722-6810 collect. Or write 6201 East Randolph Street, Los Angeles, California 90040.

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Fifteen years of leadership in electronics. 1959-1974.

### Establish Plan For Controlling I/O Procedures

TORONTO, Ont. — A simple way to determine the security of your computer system is to check it against these security "musts" concerning input and output control procedures.

- Establish a procedure for submitting jobs to the computer room, such as having users fill out a job request card containing their name and department, the account number to which the job will be charged, a time estimate of the job, and operator instructions.

- Delegate to an I/O control clerk responsibility for:

- Recording receipt of input data, as well as input control totals, in a control log.

- Ensuring that all rejections from the processing cycle are entered in an error log.

- Ensuring that corrections are marked off in a log when they are reentered into the system.

- Expediting important jobs.

- Assuring an effective and efficient work flow into and out of the computer room.

- Reconciling output control totals to input totals.

- Checking the quality of output reports.

- Distributing reports to authorized recipients.

- Retain original input documents in some form to serve as backup or as proof in the case of fraud, and store them in a secure location.

- Store blank forms in a secure location before they are used, and establish procedures to control their usage and to record destroyed copies of sensitive forms such as checks.

- Maintain additional supplies of forms used in critical jobs, so that operations will not be delayed after a disaster while waiting for a new supply.

- Distribute output reports quickly after completion, and store them in a secure location until they can be distributed.

- Periodically review and update lists of authorized recipients of output reports.

- Establish stringent controls on the method of distributing sensitive reports to other geographical locations.

- Retain copies of key output reports as backup either in their original form or on microfilm.

This checklist was compiled by DCF Systems Ltd., 74 Victoria St., Toronto, Ont., M5C 2A5.

## A NEW GENERATION OF INTERACTIVE SYMBOLIC DEBUGGERS FOR VM/370 INSTALLATIONS

Standard Data Corporation offers the finest interactive symbolic debuggers available—  
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Since 1959

## School Days

### EDP Auditing and Control Theme of Seminar Series

RESTON, Va. — Courses on EDP Audit and Control are planned by Automation Training Center (ATC). A computer background will be presented May 29-31 in Washington, D.C., as will a seminar on controls, systems, security and audit opportunities from June 3-6. Audit techniques will be covered in Chicago, on June 24-28, ATC said from 1930 Isaac Newton Square E., 22090.

### Programmer Productivity Probed

WALTHAM, Mass. — Two-day seminars on increasing programmer productivity through modular program design, top-down implementation and testing, and new approaches to organizing program development are planned by Softech for presentation in Boston on April 1-2, Chicago on May 20-21, and New York on June 17-18. Registrants should have some experience with a high-level language, the company said from 460 Totten Pond Road, 02154.

### Advanced Programming Aired

WASHINGTON, D.C. — Advanced Programming Techniques will be discussed in five three-day seminars, offered by Control Data's Institute for Advanced Technology. The schedule includes April 1-3 in Albuquerque, N.M.; April 22-24 in Washington, D.C.; May 13-15, Chicago; June 3-5, San Francisco; and June 24-26, again in Washington, D.C. The Institute is at 5272 River Road, 20016.

### Choice of Data Base Courses

TRENTON, N.J. — A series of one-day seminars on the Data Base Commitment, Data Base Package Evaluation and Selection, and the Role of the Data Base Administrator are scheduled by Performance Development Corp. for various cities throughout the spring. The company also plans 5-day seminars on IMS in Chicago, New York and Los Angeles, a spokesman said from 32 Scotch Road, 08628.

### Summer at Southern Cal

LOS ANGELES — Short courses in continuing engineering education at the University of Southern California will include Mathematical Pattern Recognition (July 8-12), Computer Image Processing (July 15-26) and Optical Information Processing (July 29-Aug. 2), a spokesman noted from 212 Powell Hall, University Park, 90007.

### The Mighty Mini at MIT

CAMBRIDGE, Mass. — MIT's Summer Program includes a two-week course on The Mighty Mini, running from June 10-21, for \$650, a spokesman said, from Room E19-356, 02139.

## 'Erector Set' or 'Black Box'

# Use, Growth Seen as DBMS Tradeoffs

By Don Leavitt  
Of the CW Staff

WASHINGTON, D.C. — Users looking at data base management systems (DBMS) face a basic choice, even among the most popular systems, of "going for a black box or an Erector Set," Leo J. Cohen said here recently.

A DBMS includes the data base itself, support for queries, programs and indexing, file organization, and the data management functions. Though some systems give the user few if any options — and therefore easier usage — others require a lot of building before they are ready for use.

The building involves the choice of the components the user wants. There are, for example, seven basic file organizations, three record types, three physical distribution methods and two indexing methods (not including binary search), Cohen noted.

That number of individual components can theoretically be combined in any of 126 ways, he went on. Not all of these are logically reasonable, however, but about 90 can be used.

Cohen has probed the current DBMS packages and developed an index of complexity and capability, which also reflects the skill level required by the end user to benefit from them.

At the top of the scale is IBM's IMS, which allows use of as many as 60 of the 90 reasonable component combinations. Total from Cincom Systems isn't far behind, with facilities for 40 to 45 of the combinations.

These, plus Cullinane's IDMS, which falls "somewhere in between IMS and

Total" are what Cohen called the Erector Sets. They are implementors' systems and have to be put together on-site to create the structure the installation wants.

MRI System's System 2000 and Software AG's Adabas, on the other hand, are "black boxes" in Cohen's view. S2000 offers about 15 of the possible component combinations, while Adabas provides support for about eight. The user has to do very little to make these systems work, but he also has little control over how they work.

He credited the fully inverted file structures used by S2000 and Adabas as the key to their low-key demands on the user.

While ease in installing and using the systems is important, another factor — performance — also has to be considered in evaluating DBMS choices, Cohen said. And while speed of execution and query capability are important performance measures, the system's ability to grow must also be weighed.

With Total, IMS and IDMS, the user can build independent data base systems, then interconnect them where data integration makes sense and where common indexing techniques can be applied. The fully inverted files of S2000 or Adabas are "quite a different story," he said. The systems are so self-contained, integration of new bases is "at best rather clumsy and perhaps even difficult to justify."

## Programmers 'Can Be Eliminated' Under 'Future' File Management

JINKINTOWN, Pa. — "Eliminate the programmer." That's the goal of the load-and-go Future file management system now available for OS/360-370 users from Future Data Systems.

Most of any application is data entry, editing, file updating and file maintenance. In basic purpose, these operations are similar enough from application to application, the company said, so that there is no real need for rewriting the routines each time they are needed.

With Future, the non-DP end user and an analyst complete a set of file description forms, listing characteristics of each field and, if significant, relationships be-

tween fields.

Punched and sorted, the profiles lead to creation of a file in standard IBM organization. The system can preexisting unrecorded files, then be used in the process phase of the Future system.

At the hypertext of the creation phase, Future prints out forms which can be used by non-DP clerk to prepare data for the process phase. The system can be driven by the user's choice of programming language, but creation of Cobol Data Division entries (which are stored on disk) tends to lead programmers in that direction.

### Checks Dependencies

The profiles of the data fields allow the system to edit incoming data for the presence of characters in particular positions, to take batch totals or do other arithmetic operations on any field, and to check for interfield dependencies. These dependencies may be positive or negative.

Going one step further, a "cross-file validation" checks not only for the presence of a character where there has to be one, but for the validity of the character against a table of predefined values.

The process phase can check for correct multirecord sequence, but can work as well from any input media and post updated information to files on any media. The output features of the system have not been fully developed, Future admitted, but there is a report generation capability already available.

The system operates in 50K under OS/360-370. Written in BAL for efficiency, it is a series of six programs, available now for \$750/mo. under lease, or \$20,000 for a perpetual license.

Future Data Systems is at P.O. Box 325, 19046.

## Packages Aid Bank Applications

NEW YORK — Commercial banks and insurance companies with 256K or larger IBM 360 or 370 installations can handle profit-sharing, thrift, stock purchase, retirement and Keogh Act Plan record-keeping and reporting with the Dream System for Implefacts, Inc.

Records are customized through 21 contribution options, 10 vesting methods including class years, 17 withdrawal controls and nine termination reasons.

Reporting includes customized employee statements, fund and participant reporting, all cash/stock withdrawal calculations and Form 1099R preparation.

Separate versions of the system are available for DOS and OS operations. Implefacts tailors and then runs it for four to six months before turning it over to the user's in-house operations.

The system costs \$55,000 under a service/purchase agreement. Data centers doing third-party processing can also acquire the system under special terms, the company said, from 1775 Broadway 10019.

WALTHAM, Mass. — Savings banks with medium-scale H2000 configurations can handle single bank, multibranch, and multibank, multibranch environments with the Metropolitan On-Line Savings System (Moss) now available from Honeywell.

The system provides on-line and batch processing capabilities in support of regular and daily interest savings and vacation clubs, time savings, and lease security.

### Relationships

The system features customer-oriented, on-line files that form a centralized information (CIF) data base of customer and application data. CIF "profiles" show the number of accounts each customer has and the account relationships he has with other customers.

Moss requires an H2000 CPU with 128K characters of main memory, two type-275 disk pack drives and control, card reader, printer and communications gear and teller terminal subsystems as appropriate. It is available for \$100/mo.

# MMS General Ledger Users are Happy Users!

The more than 100 leading corporations in the United States and overseas using the MMS General Ledger are happy groups.

That's because they have installed the finest corporate financial reporting system available. A system which provides unlimited flexibility because of its unique data base design. And a system that works in DOS, O/S, IMS or even TOTAL.

The users of the MMS General Ledger and other corporate financial reporting systems would be delighted to welcome you into their ranks. Call or write today for more information on the MMS General Ledger, world's No. 1 seller. We love to spread happiness around!

That's a happy crowd I'd like to join — please tell me more about

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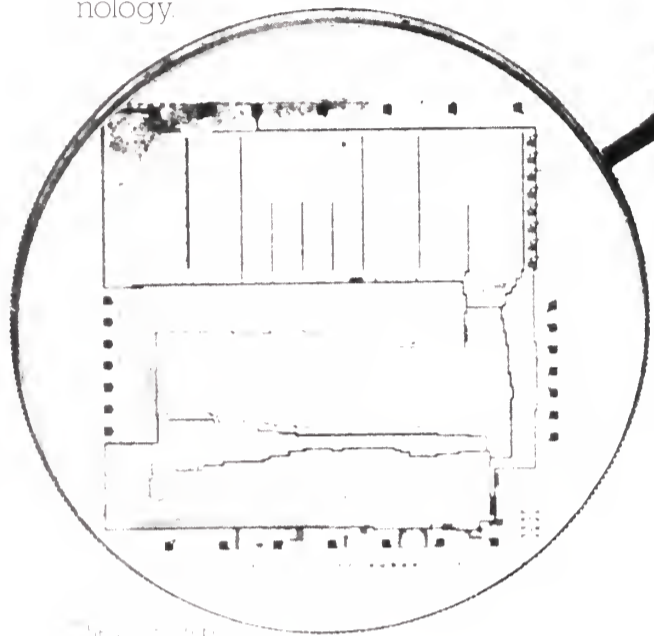
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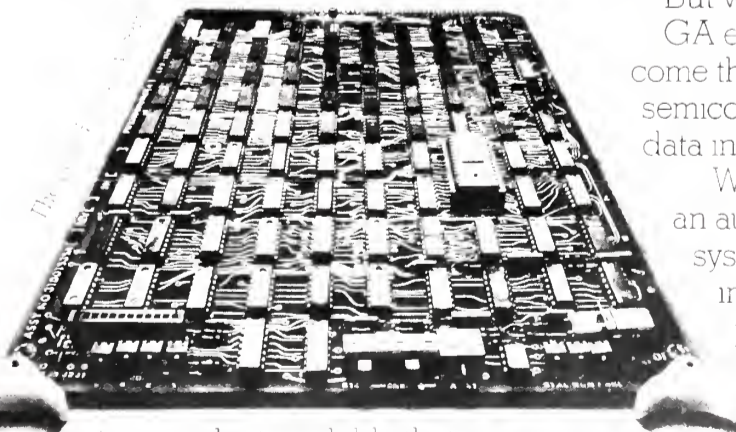
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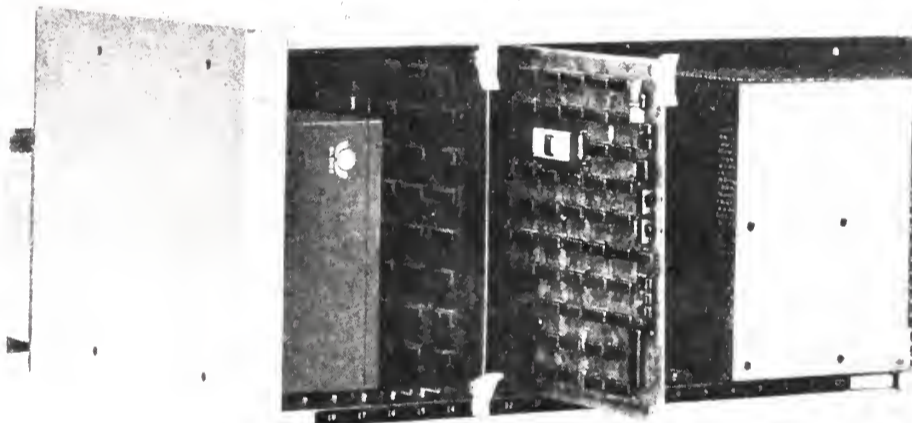
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## Cobol Standard Not Enough

# Now Is Time to Consider Standardized Applications

By Gerald H. Larsen  
Special to Computerworld

Well, we are finally close to a new Cobol standard. And things like that make headlines. So, give credit where it's due; but it's *not* for the standard itself. Rather, it's for the amazing quantities of bickering and bureaucratic nonsense suffered by its designers! The standard does very little to substantially further the state of computing. I'm sure there will be some disagreement about this, but whatever: that's what opinion's all about.

While we're on the subject of standards (since today's headline is tomorrow's fish wrapping), it's time we did a quick "up periscope" just to see if the world is still really there. There's an important message for each of us in the announcement of the new Cobol standard. Happily, it has nothing to do with Cobol.

The message says that a reasonable vehicle exists whereby serious computing

activities can be standardized and modified over time. So, now that we have a genuine existence theorem, why don't we put it to use and standardize a really important aspect of computing: applications!

I have before me Larry Welke's latest edition of the *ICP Quarterly* (which, along with Welke's newsletter, is one of the very few truly bright spots in our industry these days). For the uninitiated, the *ICP Quarterly* is an extensive (660 pages) catalog of available for-sale software. A brief survey reveals the following statistics:

Subject	No. of Packages	Purchase Price
Payroll	85	\$700—\$25,000
General Ledger	34	\$200—\$40,000
Accounts Receivable	44	\$400—\$52,000
Accounts Payable	30	\$295—\$50,000

But what does this all mean? Is it merely a beautiful embodiment of the

American system of free enterprise? The answer, of course, is no. Most of these packages, within their own *self-proclaimed* title, differ substantially one from the other. In some cases, these differences are differences in kind; but, by and large, they are a result of uncontrolled quality, lack of definition and a complete absence of standards.

Historically, most of these packages came about because commercial applications were largely unfettered by formula and methodology. Instead, they reflected the pure rugged individualism of our so-called "captains of industry" and their undying belief that job security meant fooling people into thinking you are making rational decisions by examining obviously irrelevant data.

### The Sad Truth

For the sad truth of the matter is that any person, regardless of how brilliant or

stupid, how well-meaning or exploitive, how forthright or secretive, can call virtually any collection of computer programs (debugged/non-debugged, documented/non-documented, relevant/irrelevant) a payroll!

The same holds true for each of the other applications listed above. Of course, one immediate reaction to this is to feel that we are dealing with an inherently

## Viewpoint

technical problem. Not so. For, while we may have many complaints about quality, we are in a relative land of plenty as far as that's concerned. Today's famine is a lack of functional definition.

Our old friend, the Cobol standard, postulates nothing about the quality of the compiler, its object code, its documentation or its state of readiness to operate smoothly. The Cobol standard achieves utility because it functionally defines a language and prevents the intellectually incompetent and emotionally malevolent from calling something Cobol when it more closely resembles chicken scratchings. And we need the same type of standardization for major computer applications!

### Who Will Develop Them?

But now, dear friends, we face a problem. For who among us shall develop these standards? Since altruism is a dying discipline, we must expect that the development of application standards will fall on those who stand to benefit most. To the extent that *standardized programming languages* encourage software development and, therefore, *increase* overall computer use, it's only natural to expect that hardware manufacturers will be interested in playing a role in such standards. But, while standardized applications may create an initial flurry of activity, they should, in the main, decrease software development and computer use substantially.

So don't expect to see the hardware manufacturers clamoring for such standards.

We might, of course, turn to the large user organizations and elicit their participation. But, somehow, bigness seems to give companies the right (if not the mandate) to be different. It's like the old two-liner, "what do you feed a 20-foot gorilla? . . ."

The real benefit from standardized applications will accrue to the small- and middle-sized companies which really can't afford to develop their own software but are, as yet, uncompelled to be standard. Yet, these same companies have never in the past seriously participated in any standards effort. Moreover, their participation in such activities could be expensive because of their size. Nonetheless, their participation is badly needed.

Since the sample applications I've mentioned relate to accounting, you might

(Continued on Page 19)

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# ... to Save Money and Time

(Continued from Page 18)

wonder why many of the accounting firms would not be candidates for participation in standards development.

Unfortunately, it isn't hard to visualize that standard accounting applications don't benefit the accounting firms, which are kept in business largely by law and confusion rather than any real contribution they make to net productive output in the U.S. So don't look for support from that corner.

Perhaps, as a last resort, we must look to the government for leadership. Now, government leadership these days is about as alive as altruism. Nonetheless, a large measure of the reason why standards in the accounting area don't develop rests squarely on government's shoulders.

Between the SEC, the IRS, the Department of Commerce and the federal court system, the government manages to keep American business so tangled in confusion that many substantial companies derive all their sales simply from explaining the government to other people.

This isn't the intention of government, to be sure, but when the basis for government is pressure-group legislation and pork-barrel politics rather than leadership, even the bureaucrats wind up cringing in the corners. Despite this, government is the logical focal point for applications standards.

Not only does the U.S. Government operate the largest applications operation in the world (itself), it also, through lack of leadership, forces the taxpayer to spend a fortune auditing cost-plus government procurements because it has failed to effectively standardize the way in which its contractors do business with the government and among themselves.

Change, however, requires leadership. And we need change. Standardized applications will significantly lower the money every company spends in the useless pursuit of being different in ways which don't put dollars on the bottom line.

Standardized applications will improve the auditing capability of our government and reduce the cost of this function to the taxpayer. If properly done, they will also simplify the process of fraud detection (a cause celebre these days, although we've probably spent more money funding studies in this area than the total

net loss due to fraud).

## User Reaction Sought

The booming software package market is sufficient evidence that the users in our industry are willing to forego the privilege of being different for the pleasure of producing cost-effective results. So, before too many users are scorched by the difference between retailing and reality, we'd better get some standards together which minimize the deviation between these two. And, despite my military training, I'll even volunteer to help.

If you out there in computer land like the idea of application

standards and want to do something about it, write me or the good folks at *Computerworld* and tell us what you think.

After you tell us what you think, tell us what you're willing to do. If there's enough of you, maybe we can wake up a snoozing politician or two and make an important contribution to our industry. It's up to you. If you're tired of paying for useless software development, then you'd better start doing something about it.

Gerald H. Larsen is president of Unicorn Systems Co., 3807 Wilshire Blvd., Los Angeles, Calif. 90010.

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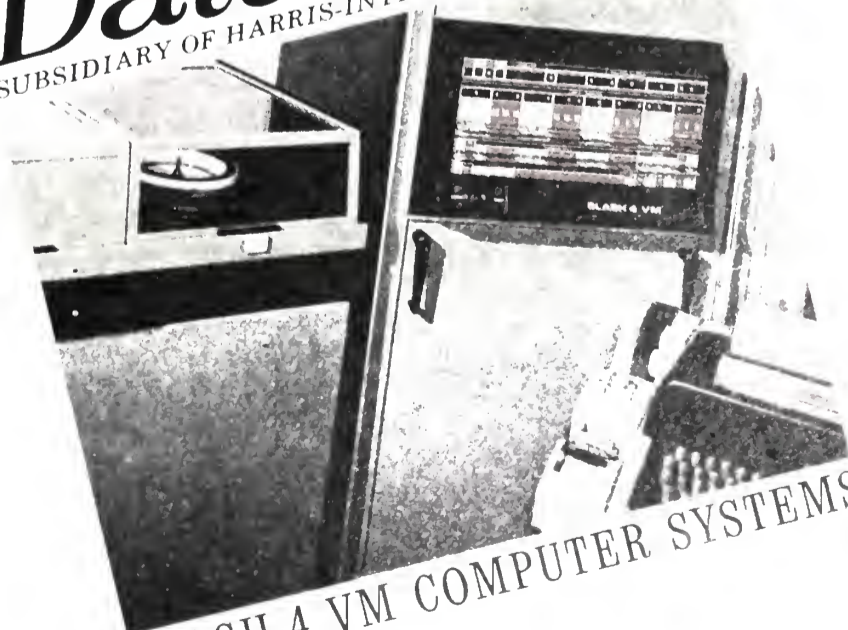
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## Data Briefs

### Collins Adds 262K Processor To C-System Network Package

DALLAS — Collins Radio Co. has added a communications processor to its C-System line which handles network management and interfacing for large users with message traffic up to 50 message/sec.

The C-8562A-1 contains 262K bytes of directly addressable memory. The processor is upward program-compatible with its predecessor, the C-8561A, but has an extended instruction set, a Collins spokesman said.

A turnkey-type C-System with dual 8562s with automatic switchover, backup and recovery; dual disks with 67M bytes, and assorted tapes, line printers and termination equipment would cost about \$1 million, the Collins spokesman said, with deliveries in nine months from the firm at Department 300, 75207.

### Units Tests Data Systems

PROVIDENCE, R.I. — The Model 3200 bit error rate analyzer from International Data Sciences, Inc. is a modular test set capable of analyzing data communication systems operating at speeds up to 70M bit/sec. The basic test set consists of three modules: a generator, an analyzer and an interface. ECL, TTL and other interfaces are standard with special interfaces supplied upon request.

The generated bit pattern is applied to the interface module where the appropriate signal conversion takes place. The analyzer module accepts a repeating pseudorandom bit stream and a timing signal from the active interface and compares this received data with an error-free replica on a bit-by-bit basis. Bit errors or bit error rate is displayed directly on a 4-digit solid-state, LED display.

The price for the basic test set is \$6,500. Delivery is 90 days from the firm at 100 Nashua St., 02904.

### IEEE Sets Network Session

GAITHERSBURG, Md. — Bernard Strassburg, recently retired chief of the common carrier bureau, Federal Communications Commission, will be the keynote speaker at the Symposium on Computer Networks, to be held at the Bureau of Standards May 23. The symposium, jointly sponsored by the Bureau of Standards and the IEEE Computer Society, will feature a panel session and 14 papers by experts in the field of computer networks.

On the day prior to the symposium, a tutorial on computer networks will be held at the Washingtonian Motel in Gaithersburg. The tutorial is intended to provide a user-oriented introduction to resource-sharing computer networks. Further information is available from Computer Networks, c/o Harry Hayman, P.O. Box 639, Silver Spring, Md. 20901.

## Move I/O out of CPU

# Minis Can Improve on IBM Front Ends

By Ronald A. Frank  
Of the CW Staff

WASHINGTON, D.C. — The mini-computer is destined to play an increasingly important role in the design of front-end processors, according to Dr. David Mills of the computer science department at the University of Maryland.

The full front-end processor is a mini-computer which has several pieces of hardware on it. One of these pieces connects to the communications network and might take the form of a modem interface or other hardware that connects to off-the-shelf data sets. Recently we have even seen units in which the modem is an integral part of the hardware, Mills explained.

If we connect the front-end processor to a number of Bell data sets we find that the cost is about \$15/mo for a low-speed device and as much as \$250- to \$300/mo for a high-speed device, he said.

If the user compares the cost of the minicomputer with the cost of the data set, he finds that the data sets comprise most of the cost, and "that is embarrassing," Mills said.

But the modem is a simple enough device compared to the complexity of the hardware in the adapters and the mini. So the modems should be integrated into the mini.

A box like the IBM 3705 was really designed to fit IBM's marketing strategies, and it wasn't designed for users' programs. The 3705 was first introduced as a replacement for the IBM 2703; it turned out to be cheaper, he said.

And then if the user added more core he could add more functions. But programs have to be bought from IBM. If the user chooses to program his own he will find "that IBM has been there before you." They have their own ideas about how it should be done, Mills said.

The 3705 interface will not allow the user to have both an emulator for the 270X and simultaneously run a program which does the front-end processing over a single interface or address to a larger mainframe.

This is a small detail of the interface hardware and could be fixed easily at such places as Bell Labs or MIT, Mills suggested, where they might be more prone to requesting an RFP (Request for Price) from IBM. But from "personal experience," an RFP to modify communications hardware is "rather a thankless task," since the vendor is often reluctant to give the user circuitry on an RFP basis which will allow connection of terminals that have a higher level of performance than the vendor's own terminals.

As an example, Mills said it was impossible to get an RFP to operate a 300 bit/sec terminal with an IBM 270X. After several attempts to get this capability, IBM finally answered that it would not provide

connections for a terminal that operated faster than the company had to offer. And this is one of the reasons why suppliers who replace terminal control units are "flourishing," he said.

### Eliminate Overhead

The first thing the front-end user wants to do is unload the storage overhead from the CPU. On the average, most front-end-type systems take 500  $\mu$ sec to one msec to process an interrupt. But programs on "conventional IBM architecture" require from three to five interrupts per line transmitted, Mills said. So for every line transmitted, the system will use up between 1.5 msec and up to 25 msec just to process the interrupts. And about 40 msec of overhead per line transmitted are "eaten up" in the software of the CPU.

This high overhead can be eliminated by moving the I/O interrupts out to the front-end processor, he said.

With the Network Control Program and bigger versions of the operating system, the evolution in IBM systems is moving in this direction, he said. Reducing this over-

head is very important since 30% to 50% of the time in a large system is devoted to interrupts.

Because of the characteristics of front-end systems, the user can utilize larger and slower core storage in the mini and save money compared with mainframe storage. This is one incentive to move the input/output buffers out to the front end, Mills said.

Among the functions that should be assigned to buffers that reside in the front end are line editing and error recovery routines.

The mini normally has no on-line storage and it can queue some messages, but basically "what goes in must come out," Mills said. To guard against failure, some front ends are duplexed and incoming messages are logged on tape. If the mainframe fails in this type of front-end system, the minis can regenerate the messages that were received when the large mainframe failed. It is much less expensive to install a second front-end than it is to build redundancy into the mainframe system, he said.

## Sycor Terminals Replace TTYs In 360/50 Teleprocessing Net

By Patrick Ward  
Of the CW Staff

CINCINNATI Mead Corp.'s Containers Division has been using intelligent terminals in 18 remote sites to handle cost estimating, payroll, order entry/billing, A/R statements, machine statistics, raw material inventory and other data, John Sherwood, manager of systems and procedures, explained here recently.

Mead first went to teleprocessing in the fall of 1970 using Model 37 KSR teletypewriters interfaced to Model 4210 magnetic tape units. This combination allowed users at the remote plants to put 180K characters of input data on a magnetic tape cartridge, Sherwood noted.

Format and editing checks were done after entry by visual inspection of the hard copy that was generated.

In the fall of 1972 "it became obvious that we were growing too quickly for the teletypewriter network to continue to support our needs," Sherwood said.

Besides the problem with growth, the firm was having more and more frequent troubles with mechanical and communications problems, he added.

"Reliability of transmitted data in the asynchronous mode was never very good at the speed we were running. As the volume increased this distortion of data became quite serious," he stated.

The 15 char./sec printer speeds were too slow, and increased volume seemed to lead to more mechanical trouble with the KSR 37, Sherwood continued.

The division considered the Teletype Model 40 CRT, the Memorex 1200 Series and the Sycor 340 Series as replacements, Sherwood stated.

The Sycor unit was chosen because of its programmability and editing capability, plus the variety of printers available, he explained.

Because of these features, Mead felt it could build a network which would fit the needs of the various remote plants and would also allow growth without the need to change vendors.

From April to August 1973, Mead changed its operating system to include Hasp, and the computer configuration was changed to a 512K 360/50. Additional disk drives and a Memorex 1270 terminal controller were also added.

By October, all the terminals were installed and four plants per week were brought on-line. By November, all locations were on-line and had been taken off the teletypewriter system.

There were problems with the start-up period in every plant, but Mead was able to get these problems solved within a week, Sherwood recalled.

Before the terminals went on-line, Mead brought one operator from each plant to headquarters in Cincinnati for three days of training.

This trained operator in turn trains his own backup and this helps establish a level of responsibility in dealing with the machines, Sherwood noted.

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## IBM Adds Features To Banking Terminal

WHITE PLAINS, N.Y. — New features for its self-service banking terminal have been announced by IBM.

The optional features for the IBM 3614 consumer transaction facility — a cash-issuing terminal introduced last year — include a depository, a receipt printer and a wide range of keyboard arrangements. They will permit a bank's customers to use the terminal at any hour of the day to deposit checks or cash, make loan payments, obtain printed records of transactions and to transfer funds from one account to another.

When depositing funds or making loan payments, the customer presses the appropriate keys and inserts an envelope — containing deposit slips, payment documents, checks or cash — into a covered deposit slot. Customers also can make payments by inserting an envelope containing a payment stub or coupon and keying instructions to deduct funds from their checking, savings or credit card accounts.

The receipt printer can generate a record of each transaction and pass the statement to the customer through the cash issue slot. The printer has a 57 alphanumeric character set and can print up to 36 characters on each statement. The statement can contain up to four 34-character lines. The printer also can create messages, instructions or other data, as directed by the bank's computer programs.

The terminal can be installed inside a bank or through an outside wall to provide a wide variety of after hours banking services. Linked to a remote computer via telephone lines, the 3614 also can be placed in supermarkets, department stores and other business locations.

The depository feature for the 3614 consumer transaction facility is available under IBM's Extended Term Plan (ETP), which provides for a two-year contract period, for \$70/mo. Banks with shorter-term needs may use the IBM rental agreement, with a monthly charge of \$82. Purchase price is \$2,400. ETP price for the transaction statement printer is \$95/mo or \$112 under the monthly rental agreement. Purchase price is \$3,300.

First customer shipments of 3614 units with these features are scheduled to begin in the third quarter of 1975.

## TTY-Compatible Means...

WASHINGTON, D.C. — "TTY-compatible" is becoming a buzzword and vendors disagree on what it means, according to Greg Kerr of the U.S. Department of Agriculture.

He defined a terminal as TTY-compatible if it can be hooked up to a teletypewriter and/or transmit its cassette to it.

### Tape Gap

Last spring Kerr began testing Hazeltine terminals but found they could not effectively simulate paper tape input with the IBM 370/145 he was using.

Kerr leased two Sycor units and uses them mostly for off-line data entry onto cassettes. He purchased Syntec 103A-compatible modems for his Sycor units and he found them reliable.

Kerr is considering trading his intelligent terminals for two dumb terminals accessing a Burroughs B700.

The two Sycor units cost \$400 each, Kerr pointed out, plus service bureau connect time.

The B700 with interface box and two

CRTs could handle his application without use of the service bureau, Kerr said, allowing him to break even. Additional applications would make the system even more economic, he noted.

### Dumb Savings

Another advantage of the B700 dumb terminal arrangement is that expansion to additional stations would simply mean adding a \$50 CRT instead of a \$400 intelligent terminal, Kerr remarked.

However, intelligent terminals might be the best choice for users who can expect to be accessing a variety of different CPUs in the future, he stated.

With the price of minis going down, Kerr remarked that small users can hardly afford not to choose minis over intelligent terminals.

With the very fast changes in the communications field, users can't afford to purchase either, Kerr cautioned. The only things he owns are the Syntec modems, Kerr said.

## Ascii Revision Set

WASHINGTON, D.C. — A proposed extension of the American National Standard, "Procedures for the Use of the Communications Control Characters of Ascii in Specified Data Communication Links," has been announced by Standards Committee X3.

The revision is the result of three years work by communications and information processing specialists. Copies are available from the Computer and Business Equipment Manufacturers Association, X3 Secretariat. It is being circulated for public review prior to final X3 ballot on its approval. Comments will be accepted until May 1.

The proposal is a revision of the present X3.28-1971, and is intended for systems controlled through use of the 10 communication control characters of Ascii (X3.4-1968).

The text of the proposed revision is available for \$4 from CBEMA/Secretary X3, 1828 L Street, N.W., 20036.

# 1700 companies cut operating costs with these 5 software packages.

## Join the group.



## Controller/Terminal Drives 10 Displays

HORSHAM, Pa. — A small, portable Ascii display controller/terminal, capable of outputting data to both video monitors and ordinary TV sets, is available from Digilog Systems, Inc.

The Series 300 can drive multiple displays (up to 10) in different locations. Teletypewriter compatibility enables the user to either replace the existing Model 33 TTYS where a keyboard is not required, or to use both the TTY and the controller and thereby enable large groups to observe what is taking place.

### Parallel Interface

Standard units provide a 7-bit parallel interface with a data rate capability of 1,200 char./sec. asynchronously. Optional serial interfaces (RS-232 and current loop) are available with multiple transmission speeds. The standard 64 Ascii character set is provided, and a choice of two output display configurations is offered. The Model 305 has a video and TV output of 40 characters by 16 lines, and the Model 306 has a video output of 80 characters by 16 lines. Prices are \$790 for the Model 305 and \$875 for the Model 306, with 30-day delivery from Babylon Road, 19044.

## WU Expands Access

MAHWAH, N.J. — Western Union will allow the use of customer-owned terminal equipment on its Infocom network.

Under a tariff proposal filed with the Federal Communications Commission, Western Union will provide access to its Infocom network for suppliers of terminal equipment and their customers. The new tariff, now in effect, includes access charges for various classes of stations.

InfoCom, a computerized communications network, offers subscribers a private, individually configured system with circuit-sharing and computer-switching. With InfoCom, a subscriber need not purchase, program or operate his own computer switch.

In addition to communicating privately on his own network for exchange of administrative messages or processed data, an InfoCom subscriber also can interconnect with other Western Union networks.

# Take It From the SSA...Investigate Workloads

By Molly Upton  
Of the CW Staff

WASHINGTON, D.C. When the Social Security Administration (SSA) planned its communications network, implementation time was a key constraint, Gerald G. Walker III, consultant to the SSA, said.

Within essentially a 14-month time frame, a nationwide network needed to be up and running.

In addition, there were other criteria such as least cost alternative consistent with performance constraints, flexibility and the capability for growth. Currently, 500 out of the 1,500 SSA offices have terminals and generate 65% of the workload.

Most of the volume is batch entry of new accounts and updates for SSA benefits.

The on-line capability is used for cash payments to recipients.

Walker urged users to investigate in detail the workloads their systems would handle, not only in terms of how many

characters transmitted and messages a day, but the volume from various areas.

The SSA did not have such detailed information when it designed the network, and had to guess as to volume of

## Planning a Net

use, he noted. In addition, a new application of a supplemental income program would be created, and estimates called for this to increase network use by 80%, said Walker, vice-president of Systems Architects, Inc.

Currently the volume of queries handled is about 23,000/day, and estimates called for 22,000/day, he said.

"We came closer than we ever could have hoped for," he added.

"We looked for an optimal practical network. We could have designed a full network for less money, but there would have been no opportunity for growth or flexibility," he said.

"If there are no constraints on network design, you can come up with some weird results," Walker added.

In the SSA Data Acquisition and Response System (SSAdars) one vendor was chosen to be responsible for all equipment and maintenance. GTE was the low bidder on a fixed-price five-year contract.

### Network Planning

For its part in network planning, the SSA established a project office, with its own people and consultants, to work with GTE on a high decision level. The SSA also has assigned managers on parallel positions with those personnel from GTE. This one-on-one coverage has been very effective, Walker noted.

The SSA is working with GTE to be able to take over operation of the network. As part of the contract, SSA owns the software.

When started, there were 463 terminal units, with 771 keystations. The contract gives SSA the option of doubling this number in five years, all on the fixed price. In addition, a clause in the contract provides for equipment enhancements and response requirements for hardware and software service and maintenance.

The "intelligence" is located within the GTE 270T concentrators, which are installed in the existing seven regional SSA program centers. Although these locations may not have been ideal from the standpoint of network design and cost, considering the time constraint and their availability, it was the most feasible solution, Walker said. The concentrators are in New York, Philadelphia, Baltimore, Birmingham, Chicago, Kansas City and San Francisco.

The network is used for batch data entry, administrative messages and on-line query response.

The terminals have editing capability and pages of text are transmitted to the concentrators, checked, and if the entire record, which could be many pages, is all right, the concentrator transmits to the central DP site in Baltimore, where it passes through a Tempo II front-end processor to an IBM 370/165.

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**2 Job Accounting System**—For IBM 360/370 systems operating under DOS or DOS/VS. Puts job accounting information in meaningful reports for management.

**3 Teleprocessing Interface System**—Designed for IBM 360/370 systems operating under DOS and DOS/VS, handles 2260 or 3270 terminals in

local or remote environment. Low core overhead, minimum education, easy implementation.

**4 Work Station**—Lets IBM users communicate between remote DOS and OS installations. Executes in one partition of a multi-programmed DOS system so you don't need to dedicate entire system as a terminal.

**5 COBOL Programmer's Tool Kit**—Six aids that cut the cost of writing COBOL programs. Includes Flow Chart Generator, Cross Reference Processor, Decision Table Translator, Macro Generator, Shorthand Translator, and Debug Facility.

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- ☐ COBOL Programmer's Tool Kit
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## Multiplexer Handles Up to 20 Data Streams

FORT WASHINGTON, Pa. — TeleDynamics, a division of Ambac, has brought out a series of frequency division multiplexers capable of transmitting up to about 20, 75 bit/sec half-duplex data streams over a dial-up phone line.

The units use frequency shift keying and have separate transceiver/control functions for each channel, according to the firm.

The Type 7260-100 Single Channel Sub-set allows for channel drops at remote locations and the Type 7260-600 can accommodate up to six channels.

Prices of the 7260 FDM Series are about \$400 per channel end with delivery in 30 days from the firm at 525 Virginia Drive, 19034.

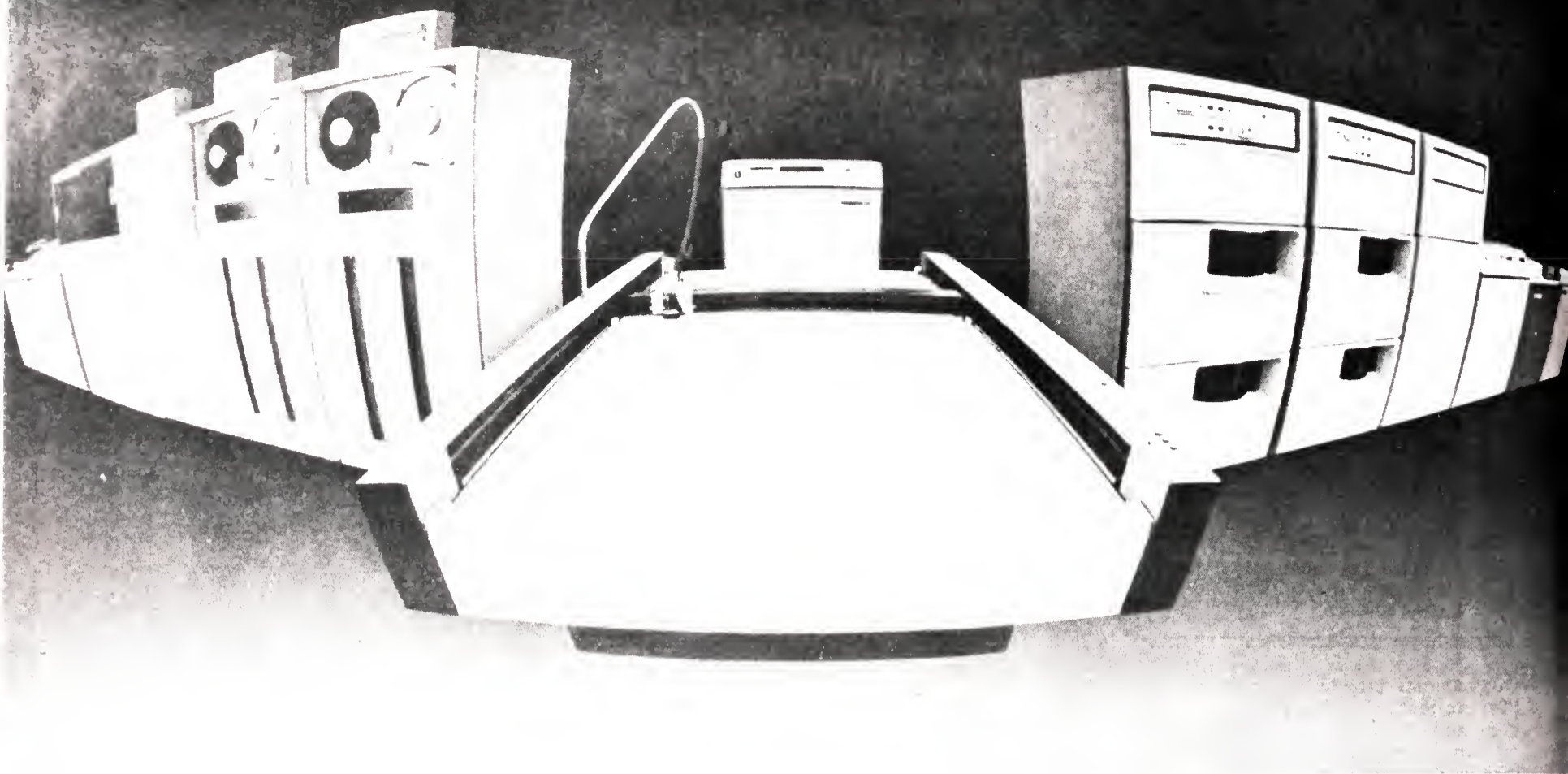
## Seminars Offer Overview

WASHINGTON, D.C. Control Data Corp.'s Institute for Advanced Technology will hold five three-day seminars on data communications systems starting April 8-10 in San Francisco at the Westbury Hotel.

Designed as an overview, the seminar covers "the history and major aspects of data communications systems," according to the institute.

The seminar will also be held April 24-26 at the New York Sheraton; May 15-17 at the Hay Adams Hotel in Washington, D.C.; May 29-31 at the Writers' Manor in Denver; and June 19-21 at the Ramada Rosslyn in Arlington, Va.

Registration, including course materials and luncheons, is \$350 from the institute at 5272 River Road, 20016.



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## A Look Toward 1985—Part II

# Punch Development Over, Improvement Elsewhere

By Vic Farmer  
Of the CW Staff

CAMBRIDGE, Mass. — The age of the keypunch is just about over, according to a technology assessment by Arthur D. Little, Inc. (ADL) conducted for the U.S. Air Force recently.

The Air Force contracted for the study to provide a solid view of the state of the art before it decided on how it would update and modernize 150 air base centers presently using over 150 Burroughs 3500 CPUs and 100 Univac 1050 CPUs.

Frederic G. Withington, who directed the DP equipment portion of the study for ADL, predicted that engineering development work on card equipment — both readers and punches — has just about come to a halt and the heavy electromechanical-oriented equipment will not be radically improved over the next 11 years.

By 1985, moreover, there will be mostly evolutionary changes in system peripherals, he said. The use of tape for simple batch processing and audit trails will not be affected, but tape densities most probably will nearly double to a maximum of 10,000 byte/in. compared with the 6,250 byte/in. level of today. Data entry by voice input will be used but in very limited applications, he predicted.

Cost performance of the processors will improve by a factor of 10, as will the cost performance of memory, with semiconductor memory dominating, the report said.

### Disks Will Improve, but . . .

Disk drives will see a fivefold improvement over the IBM 3330-11's 200M byte/spindle. The disks of 1985 will store 1G byte/spindle, but Withington cautioned that at this density users will run into arm movement problems, and it is possible the IBM 3340 module approach will be the preferred medium in order to have more arms seeking simultaneously.

"We will have the spectrum of the IBM 3340 at one end and units like the Storage Technology clustered disk packs at the other end, and it's really the number of access arms that will be the critical architectural trade-off," he noted.

As to printers, Withington saw little change. Non-impact printing will "be getting more clever and more attractive as an alternative to impact printing," but the grandson of the 1403 will still be around as "long as we live," he said.

Aside from the Air Force report, Withington disclaimed the belief of some industry experts that IBM will be the only general-purpose mainframe manufacturer by 1985. He said four companies will continue to offer full lines of general-purpose systems: IBM, Burroughs, Univac and Honeywell. The other mainframers by then will have specialized their offerings in limited areas.

Discussing future systems architecture,

Withington said: "If a system is to be easy to use and adaptive to on-line workloads, its overall design (or architecture) and its system software are more important than its hardware. The latest announcements by the manufacturers make it possible to foresee the trends in these areas as well.

"Virtual memory techniques that permit automatic memory mapping are already in use in all the latest systems. Even newer is the idea that the location of files (in high-speed memory, backing storage, mass random-access storage and tapes) will also be a system-controlled function of usage. There is no theoretical problem, and virtual files contribute to ease of use, so the technique will be universally used," he forecast.

"Variable stored logic is also widely used to accommodate various languages and emulators. Some recent systems extend the use of stored logic to the specification of functions at a hardware module. This principle will be extended to the point that computers and controllers of various kinds will be able to interchange functions, so that fourth-generation systems can be reconfigured dynamically," he explained.

"Variable stored logic also seems to be the route towards the solution of the users' compatibility problems. Entire computer systems including peripherals and operating systems can be emulated by virtual machine monitors. These exist today but are too inefficient for general use. Using high-speed stored logic, they can probably become operational tools," he said.

"Automatic file management is slowly approaching as file management software improves and file controllers become more sophisticated, containing mini-computers with their own stored logic. We cannot be sure that fourth-generation systems will be able to achieve the ultimate where the user need not have to know how his file is structured, maintained or indexed, but they will surely approach this goal and all users' applications will be easier to implement," he said.

"Automatic communications management, where varied line, terminal and message characteristics are automatically accounted for by the front-end controller and system management software, is nearly met in the latest announced systems and will surely be a feature of the fourth generation," Withington stated.

### Distributed Processing Extended

Distributed processing, including both multiprocessing in central systems and delegation of functions to the mini-computer-based subsystems in the network, is already a feature of most advanced systems. He said it will be extended further to take advantage of more versatile stored logic and to provide auto-

matic fail-soft for reliability.

Ease of use in a system with distributed processing requires automatic scheduling and assignment of the processors by the operating system. This is now done fairly well by some operating systems, and will be done by all, he predicted.

Fail-soft, which requires multiprocessing, can be achieved by the periodic insertion into the job stream of routines that test the operation of each system module. When a module fails a test, the job stream is rescheduled to put aside low priority operations, the failed module is isolated, the operator is informed of the failure — and the system never pauses.

Self-measurement is important because the user has no idea what a real-time, self-scheduling system is doing. "It must issue comprehensible reports showing which portions of the system were used to what extent on which jobs. It must show where bottlenecks occurred in the system and report on the sources of errors and problems. To some degree all modern operating systems already do this, but much improvement is possible."

Withington said.

"Finally, fourth-generation systems will be directed by interactive, easy-to-use command languages. The systems will store what they can about programs' resources and software requirements, and will ask the operator only for what he must uniquely provide with each new command.

"The vocabulary used will be symbolic and close to English in nature, and the system will prompt the operator by leading him through the needed set of instructions. This simplified command language may do more than any of the preceding to make computers easy to use, but it cannot exist without them. It will probably overlap with programming and inquiry languages in the future so that users with very little training can develop 'private' information systems. This overlap will develop slowly, though," he concluded.

Part III will demonstrate the configurations of the fourth generation according to ADL.

## What's 3340's Real Data Rate?

By Vic Farmer  
Of the CW Staff

When potential users of IBM's 3340 disk drive and the 3348 disk module wanted to figure out just how IBM came up with its 885,000 byte/sec data transfer rate, they hit a stone wall.

The 8,368 byte/track multiplied by the 49.4 rev/sec gave only 413,379 byte/sec, which was under the 885,000 figure IBM supplied, and considerably under the 806,000 byte/sec of the 3330-type drive.

Now that the 3340s have been delivered on selected 370/125 installations, IBM has provided the answer.

Each physical track consists of two "logical" tracks which are read sequentially and conceivably cover only 180° of a typical 360° track. Each logical track can store a maximum of 8,368 bytes of user data, or a total of 16,736 bytes.

In addition, each logical track contains a small number of bytes as overhead for internal control purposes. So the 885,000 byte/sec data rate is a combination of 826,758 bytes of data plus 58,242 bytes of overhead per second — a data rate very close to the rate of the 3330 drives.

For all practical purposes, this 826,758 rate is the effective data rate, and the balance is a transparent overhead for the user.

The error correction coding (ECC)

scheme does differ from the 3330s, however. The 3340 detects all single error bursts of an 11-bit span or less and can correct single error bursts of a three-bit span or less. The 3330 can detect all single error bursts of a 22-bit span or less and can correct single error bursts of an 11-bit span or less, according to IBM.

IBM defends the use of the shorter 11-bit span because "advancements in technology and techniques in the time span between the development of the 3340 and 3330 provided new design tools. These advancements made it possible to design the 3340 ECC at less cost for the user without sacrificing reliability."

IBM also revealed that the 3348 Model 35 disk module uses three data storage surfaces, and the Model 70 uses six data surfaces. The disks spin at 2,964 rpm.

Users of the 3340 units under DOS/VS will have to recompile applications programs specifying the 3340 as the new direct access storage device (DASD) type. On the 370/125 and 135 a compatibility feature is available that allows the user to execute programs written for 2311 or 2314 drives without change.

A field developed program for DOS/VS users called Device Independent Open allows a user to execute 2311, 2314 and 3330 applications with little modification. OS/VS, being device independent, needs no recompiling.

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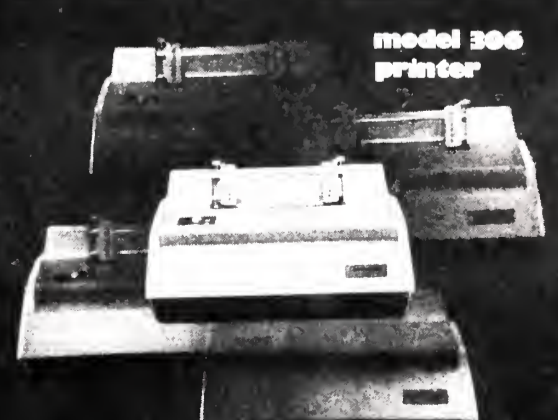
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# 370 Users Found Generally Happy With Equipment

DELRAN, N.J. — Users of IBM System 370 computers are generally well-satisfied with both the equipment and software. That was the principal conclusion of a series of Datapro Research Corp. in-depth interviews with 20, 370 users.

The 20 users rated their systems and the associated IBM support in 10 areas:

	Excellent	Good	Fair	Poor
Ease of conversion	14	5	0	1
Ease of operation	10	10	0	0
Reliability of mainframe	7	11	1	1
Reliability of peripherals	3	15	2	0
Maintenance service:				
Responsiveness	8	11	1	0
Effectiveness	8	11	1	0
Technical support	4	10	6	0
Manufacturer's software:				
Compilers	2	17	1	0
Operating system	4	12	1	1
Overall satisfaction	6	12	1	1

The users interviewed had a total of 29, 370s installed, including four Model 135s, 12 Model 145s, four Model 155s, six Model 158s and three Model 165s. Of the 29 computers, 18 were still running under System 360 software (DOS or OS), eight

were running under IBM's new virtual storage operating systems (DOS/VS, OS/VS1, OS/VS2 or VM/370), and three were running under Edos. The Computer Software Co.'s proprietary DOS replacement.

The report did say that the one respondent who assigned a "Poor" rating to both mainframe reliability and his overall satisfaction with the system had acquired one of the early 145s. He said IBM had to replace all the circuitry in the central processor.

"Other users reported sporadic central processor failures, which could not be related to each other or quantified in any meaningful way," according to the report.

IBM's only significant weakness appeared to be in the area of technical support. Most of the six users who gave the company only a "Fair" rating in technical support were early implementors of the virtual storage operating systems who felt that IBM had not given

adequate training to its own support personnel before turning them loose on the public.

It is clear that the 370 users, on the whole, were well pleased with IBM's new product line, the report indicated. Users were particularly happy about the ease of conversion from the 360 to the 370 (although it should be noted that in most cases the hardware conversion did not coincide with an operating system upgrade).

The eight users of the new virtual storage operating systems expressed no major complaints about their implementation or performance, and several noted that the initial releases of these systems were relatively "clean."

\*None, however, reported achieving the high virtual storage to real main storage size ratios that many users envisioned when IBM's "direction of the future" was announced; 8 to 1 was the highest ratio reported, and ratios of around 4 to 1 were more common for both DOS/VS

and OS/VS users.

"Only one site reported a 'catastrophic' failure on the part of an IBM product that undermined the conversion effort, and that was a problem in converting DOS Btam programs to run under DOS/VS," the report added.

The results of this user survey, along with detailed descriptions and analyses of all the current 370 equipment and software, are contained in a 62-page *Datapro 70* report available separately from the corporation for \$10. Datapro is at 1805 Underwood Blvd., 08075.

## OEM Products

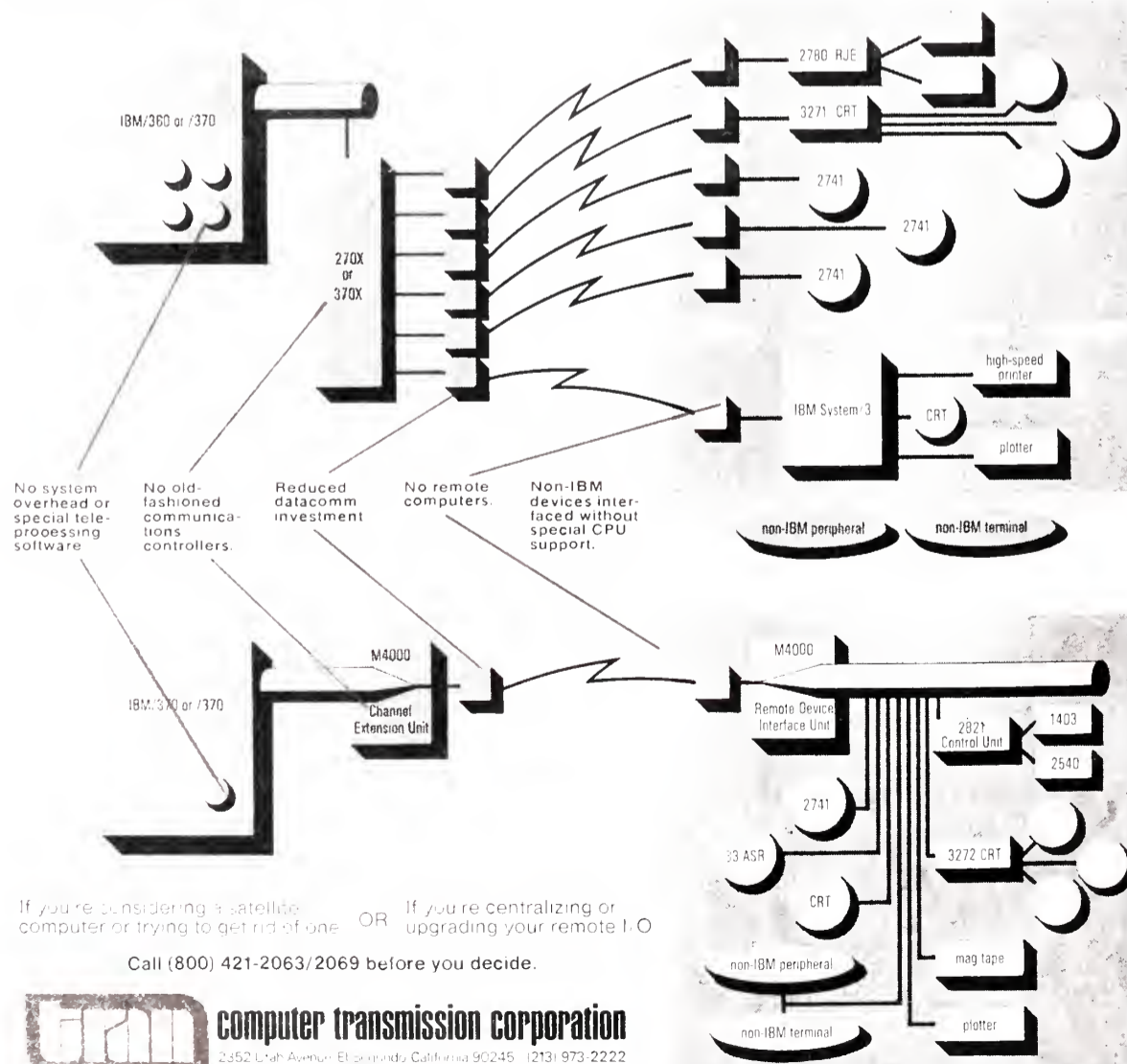
(While equipment in this column is primarily for Original Equipment Manufacturers (OEMs), in most cases it is also available in single units to interested users. Further, while much of this equipment is not presently available as such to the end user, it does give some indication of techniques and products that may be incorporated into end-user equipment.)

## It's not nice to fool IBM.

### But we had to simplify the communications tangle.

It's certainly not IBM's fault that datacomm was designed for teletypewriter I/O. The "dataset-line-dataset" standard of the telegraph business was adopted by the computer industry because everybody thought voice-grade speeds would be more than enough. That serial standard was incompatible with the computer's operation, so the communications controller and its high-overhead software were invented. Until now, that's how computer systems have had to live with the limitations of communications technology.

TRAN's M4000 High Speed Remote Processing System fools your IBM mainframe into thinking its remote devices aren't remote. M4000 effectively adapts communications to the high speed needs of your computer system by making both IBM and non-IBM remote peripherals and terminals totally transparent to the central computer.



And your IBM computer will never know the difference.

## Tape Test/Exerciser For Most Transports

FULLERTON, Calif. — A portable off-line test/exerciser for digital magnetic tape transports, developed by Wilson Laboratories, Inc. is designed for use with most tape transports in general use today.

The Wilson TX-1000 features a switch-selectable programmed mode, which causes a series of preprogrammed exercises to be performed on the tape transport being tested, so that problems can be isolated and identified. All errors are automatically tallied and displayed in an error count register.

Both NRZI and phase-encoded interfaces are provided for data densities of 800- and 1,600 bit/in. at tape speeds of 12.5-, 25-, 37.5-, 45-, 75- and 112 in./sec. Customer-specified interfaces and tape speeds up to 200 in./sec can be provided.

The TX-1000 checks all transport control and response functions, writes, reads and checks data, and has sync output for use of an oscilloscope in conjunction with the tester.

The TX-1000 is priced at \$1,495, and the company is at 2536-D E. Fender Ave., 92631.

## Sycor Has Disk Unit

ANN ARBOR, Mich. — Sycor, Inc. has announced an IBM 3740-compatible, flexible disk recording unit, field upgradable from a single disk to a dual disk unit.

A special side sensor, mounted in the recorder, detects the operational side of the disk and forwards this information to a status line.

Average data access time for a random seek is 176 msec or 2.5 msec track to track.

A special interface command permits remote activation of the motor, eliminating the necessity of continuous rotation when not in use.

Tested error rates indicate one recoverable error in 10 to the 9th bits and one nonrecoverable error in 10 to the 12th bits, according to the firm.

The 100 quantity price for a dual diskette recording unit is \$900.

Sycor is at 100 Phoenix Drive, 48104.

## Disk Systems Go With PDPs

CANOGA PARK, Calif. — Alpha Data, Inc. has announced a family of fixed-head disk memory systems compatible with the PDP-11 minicomputer. Capacities range from 65K words to 16.8M words with average access times as low as 2.1 msec.

System prices start at \$6,850 in quantity. A typical 2M-word ADC-11 system in quantity costs \$15,675. Delivery is eight to 10 weeks from the firm at 8759 Remmet Ave., 91304.

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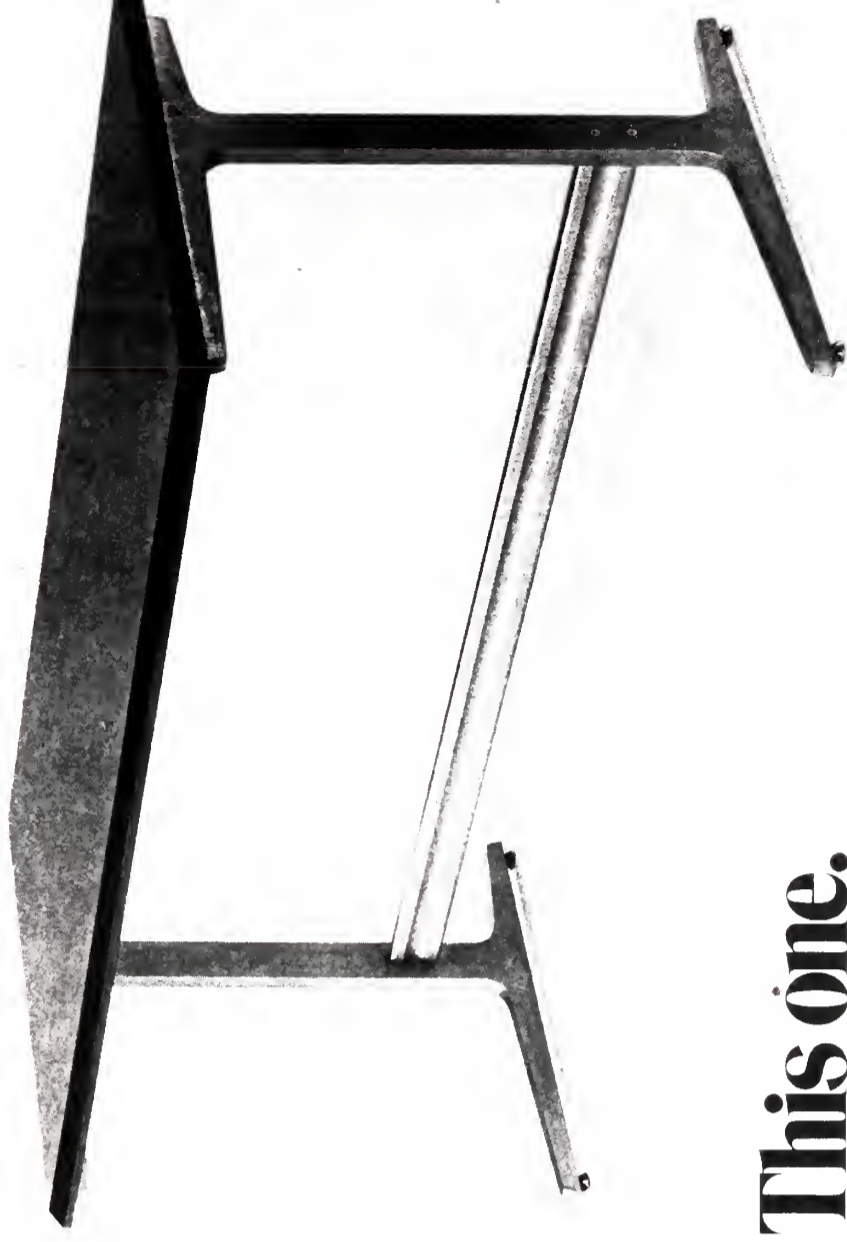
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typewriters,**

**one for  
programmers,**

**one for  
microfilm readers,**



**and one for  
just plain work.**



**This one.**

The function of Tab Data Display Desks can be adapted to whatever work you need to get done. Component options let you make the desk a programmer's work station; another change makes it ideal as a CRT desk; still other pedestals and desk returns can transform it into a secretarial desk; or, used without components, the desk is an ideal conference or work table. You select from 2 and 3 drawer pedestals, 6 and 12 drawer card files, desk return, modesty panels, 27"

and 30" heights and 31 1/2", 45" and 62" lengths to create the exact desk you need to accommodate virtually any function. Tab display desks come in black and simulated walnut or contrasting shades of grey, with pedestals in any color you need to suit your office decor.

For complete information contact your local Tab representative, or write Tab Products Company, 2690 Hanover Street, Palo Alto, California 94304.



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# Announcing Cubic. A computer tape you can lay money on.

It's easy to prove that new Cubic computer tape has twice the resistance to edge damage—the major reason for tape retirement.

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**The test:** Borrow a tape tester and a stack of quarters from a Memorex representative. Miniature beam balances measure the cross-sectional strength of two tapes. Cubic stands firm under the load of 2 to 3 times as many quarters as conventional tapes. If we aren't right, keep the money.

**The analysis:** A tape's side load properties increase with the cube of the base thickness and Cubic has the added strength of a 25% thicker base.

**The performance:** Cubic's edge strength does more than extend tape life. Cubic's extra rigidity makes it ideal for spanning gaps in

load transports. But in any transport, Cubic helps compensate for machine skew, improves start/stop operation, and gives more consistent readouts from the high performance, high density 9 track tape drives.

Of course Cubic conforms to industry performance standards and is certified for 6250 BPI. The difference is that Cubic is structurally engineered to meet those standards for a much longer time than conventional worktapes.

Memorex Corporation, Computer Media Products, 1125 Memorex Drive, MS 9064, Santa Clara, CA 95052



## MEMOREX

## Books & Brochures

### Configurations Outlined

*System Configuration Study on the Interconnection of the IBM 370/165, DECsystem-10 and Micro 1600/21 Computer Systems*, by Tom Wyrick and David K. Hsiao, Document No. AD-770 611/2WC, National Technical Information Service, P.O. Box 1553, Springfield, Va. 22151, 30 pages, \$3.00.

The authors recommend a configuration for the interconnection of a 370/165 and Decsystem-10, and discuss recommended 370/165 and Decsystem-10 configurations and a communication subnet configuration.

### Report Describes On-Line COM

*IBM 360/FR-80 On-line Computer Output Microfilm System*, by D.H. Speas and A.J. Smith, Document No. ANCR-1119, National Technical Information Service, P.O. Box 1553, Springfield, Va. 22151, 93 pages, \$5.45.

This report describes an on-line method developed and used by Aerojet Nuclear Co. to transmit command streams generated on a 360/75 to the FR-80 microfilm system.

The method provides for the automatic generation of microfilm output from the transmitted data. Instructions are given for the user to obtain computer output on microfilm. Detailed instruction is given for the system operator from setup procedures to error recovery.

### Debugging Aid Explained

*A Hardware Breakout Debugging Aid for the PDP-8/I*, by F. Anthoni and A. H. m e l a a r , Document No. N74-10181/7WC, National Technical Information Service, P.O. Box 1553, Springfield, Va. 22151, nine pages, \$3.00.

According to the author, any standard PDP-8/I mini can be equipped with a hardware breakpoint debugging aid by wiring a comparator module and a control switch panel. This hardware addition matches the contents of the memory address register with the contents of the control switches in order to halt the computer at the selected breakpoint address.

### NCR Cassette Handler Links Terminals to Century CPUs

DAYTON, Ohio The NCR 636 dual-cassette handler loads tape cassette data into NCR CPUs from NCR 399 accounting computers, NCR 270 financial terminals, and NCR 280 and 250 electronic point-of-sale systems.

The handler accepts single-track Phillips-type magnetic tape cassettes with Ansistandard recording at 800 bit/in., running at 7.5 in./sec. It has a transfer rate of 750 char./sec.

Initial customer deliveries are scheduled for the second quarter of this year. The unit is priced at \$11,000 and can be rented for \$275/mo.

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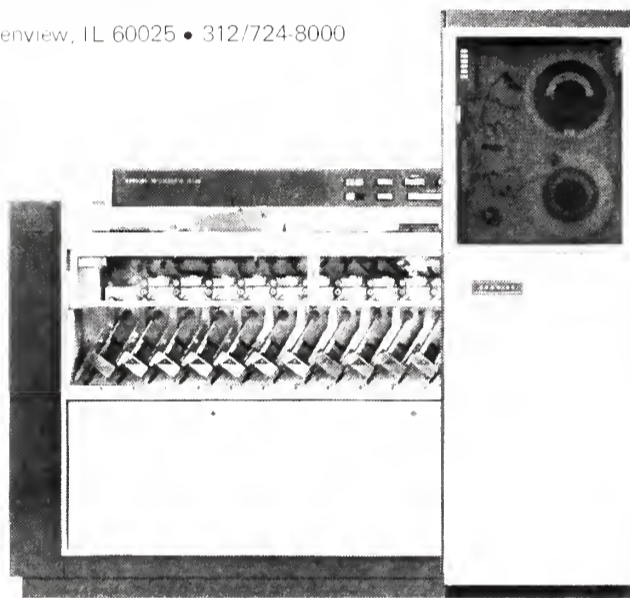
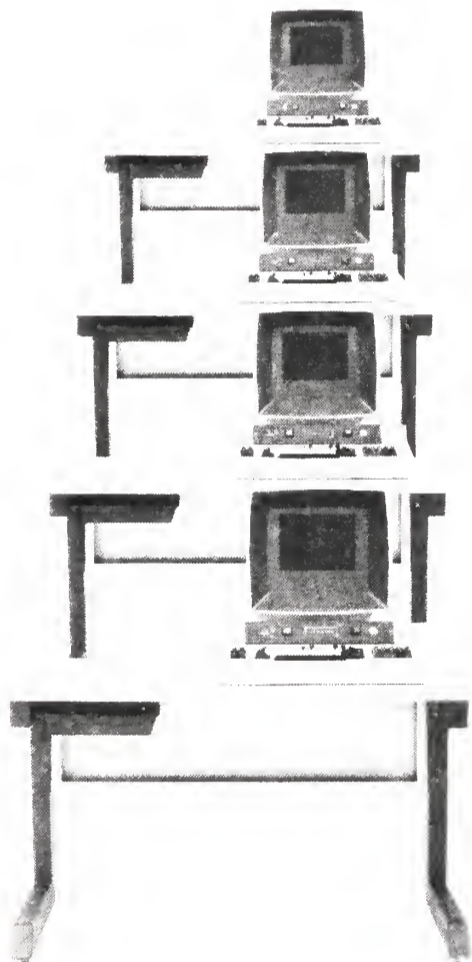
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## X3T9 to Reevaluate View on Standards For I/O Interfaces

WASHINGTON, D.C. — The American National Standards Committee on Computers and Information Processing (X3) will take a new look at its activity on input/output interface standardization. The decision to reexamine the program was taken after extensive discussion at the X3 meeting recently held at the Computer & Business Equipment Manufacturers' Association, secretariat to X3.

The committee also voted to withdraw a negative position on channel level interfaces previously submitted to the International Standards Organization.

Efforts at I/O interface standards development had been under way for over six years without success. Recently, studies had been initiated on possible standardization relating to device-level and to minicomputer interfaces. Increased interest by user organizations and peripheral equipment manufacturers was the basis for the X3 review.

In addition, X3T9, the technical committee concerned with interfaces, was instructed to "submit for X3 consideration a positive explicit program of work for the identification, development and evaluation of a family of interface standards required to achieve increased interchangeability of peripheral components," a spokesman said.

Persons or organizations interested in participating in the development of interface standards should contact: D.L. Shoemaker (chairman X3T9), GSA/ADTS, 1121 Vermont Ave. N.W., Room 710, Washington, D.C. 20405.

## Shock Recorder Monitors DP Shipments En Route

BEDFORD, Ohio — Users shipping their computer equipment from one site to another can monitor the shipper's degree of tender loving care with a shock recorder available from Impact-O-Graph Corp. The Model 21C is a self-contained 21-day recording accelerometer with the ability to record the time, direction and magnitude of all in-transit shocks and impacts, according to the company.

Firms use the permanent record it produces to pinpoint mishandling in-transit and prove claims, the company said.

The 21C costs \$580 or leases for \$90/mo on a 30-day self-renewing basis from the company at 181 Northfield Road, 44146.

## Two-Part Audio-Visual Package Covers Data Processing Basics

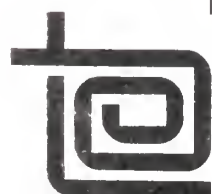
CHERRY HILL, N.J. — A two-part audio-visual education package provides an introduction to the fundamentals of data processing and the concepts of system design and analysis.

Available through Management Information Corp., Part 1 covers a data processing introduction, input/output and programming. Part 2 covers system analysis, a case study in system analysis, Pert and linear programming.

Both parts are priced at \$195 each from 140 Barclay Center, 08034.

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## Simulation's the Theme

TAMPA, Fla. — A survey of the state-of-the-art across a broad range of applications is in store for registrants at the Seventh Annual Simulation Symposium.

The first day's topics range from network data communications simulation to a manpower analysis of private practice dentistry through simulation.

The simulation of police patrol and dispatch will be discussed the second day, as well as the simulation of a management information system.

The Federal Aviation Administration will present a paper on the final day, outlining a number of projects it is currently running.

Simulation and analysis of a loop communication system, and of multiphasic health testing units for design optimization will also be covered on the third day of the symposium.

Registration for the symposium, March 13-15 at the Sheraton-Tampa Motor Hotel, is \$95. Further information is available from Annual Simulation Symposium, P.O. Box 22573, Tampa, Fla. 33622.

## Society Sundries

George Glaser, president of the American Federation of Information Processing Societies (Afips), will deliver a major address at the 1974 National Computer Conference & Exposition.

In his address on Thursday, May 9, Glaser will explore the increasing diversity and complexity of computer applications throughout U.S. industry and government; current and impending technological developments which can be expected to stimulate such applications even further; a humanistic view of the possible consequences of the widespread dispersion of low-

cost computing power; and the evolving responsibilities of the computing profession and the individual computer professional.

The National Microfilm Association's latest directory of officials is available from NMA, 8728 Colesville Road, Silver Spring, Md. 20910.

A Microdata Users Group has been formed. Information on the group is available from Dr. Ted Lewis, Computer Science Dept., University of Southwestern Louisiana, Lafayette, La. 70501.

## Law Enforcement Systems Two-Day Workshop Topic

SAN FRANCISCO — A two-day workshop to provide practical guidance in making decisions related to the development of law enforcement systems will be held at the University of California extension here, April 26-27.

Friday's program will include a session on the history, issues and problems of law enforcement systems, as well as a look at the issues of privacy and security.

The afternoon sessions will

deal with telecommunications systems and advanced computer applications.

Equipment selection will be the topic of discussion on Saturday morning, with a problem-solving session scheduled for the afternoon.

Registration for the conference is \$150. Further information is available from Continuing Education in Engineering, University Extension, University of California, Berkeley, Calif. 94720.

## DPMA Chapter Lends Hand

By Marion Rubinstein

Special to Computerworld

DALLAS Five years ago, Bishop Dunn High School became one of the first private or public secondary schools in Texas to offer a computer course. It happened because the Rev. Brother Anthony Du Rapau, then mathematics teacher and now also assistant principal, felt strongly about the future of the computer.

"The computer has great potentialities. I do not believe it will replace men, but instead relieve many men of monotony so they can be creative. Of course, that means those men and women who want to be creative

and also have the ability," explained Du Rapau.

Last fall a second course was offered students interested in the computer who wanted to get specialized knowledge.

Up until a year ago, the computer course was limited to reading manuals about computers and some visits to Dallas firms that used computers. Then the Dallas Chapter of the Data Processing Management Association

### Societies/ User Groups

(DPMA) became interested in the course.

"Soon we got voluntary teachers from the Dallas chapter," reported Nancy Creamer of DPMA. "They gave up their free time to teach at least one evening a week."

Manuals were furnished the students at no cost. Hardware was furnished without cost by several firms.

Du Rapau feels strongly that computer courses are most important to students these days, not only to start them thinking about the work opportunities they offer for their future, but also because he feels "programming will be an important requisite in colleges in areas like engineering and sociology.

"In many colleges, knowledge of a computer might also be considered as a second language and credit given students accordingly," he said.

"Students will derive more value from their college years because of this knowledge."

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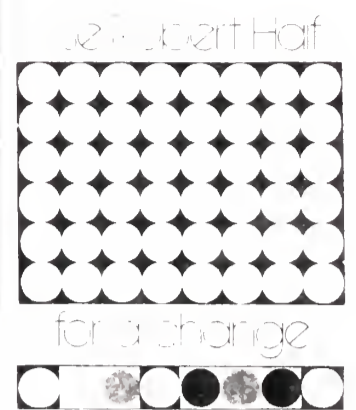
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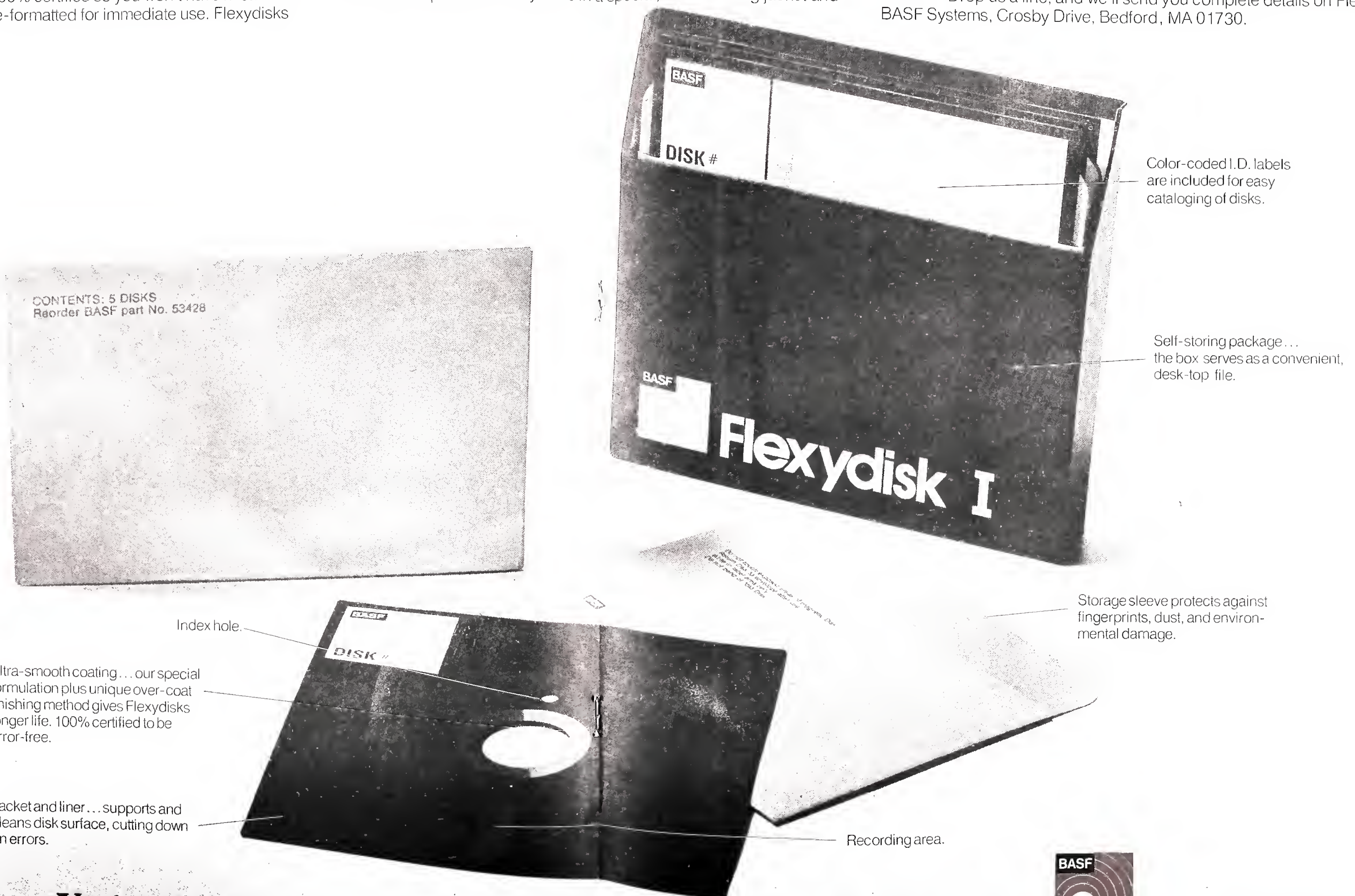
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# No Magic Way to Secure Operating Systems

DP security is a complex, interactive mix of physical, procedural and data protection, with a healthy amount of backup and audit.

This series gives an overall look at the security responsibilities of users and vendors, defines the threats to security and analyses in detail protective measures to minimize security risks.

Software and procedural elements of data security are perhaps where computer security becomes the most technically challenging. At present there is no magic solution on the market. IBM's RSS (Resource Security Subsystem) is installed and operating at four test sites. However, the package will not be commercially available.

Results from the test use of the system will be available later this year as part of the \$40 million security bonanza, and most likely we will eventually see a "secure" operating system from IBM.

Honeywell's Multics has a large variety of built-in security. Its ring of protection concept, under development since 1965, provides a flexible and useful but not foolproof authorization implemented in a combination of hardware and software.

General Electric's Information Services Division has implemented software protection at the operating system level for time-sharing applications. GE has dared its users to attempt to "break" the system, and has not yet had to pay off a \$5,000 reward.

Military and government agencies have developed varying degrees of home-grown operating systems security for some of their more sensitive applications. Outside of these few noteworthy exceptions, however, we are still looking in vain for "secure" operating systems.

## Program Security

Data security can be broken into three elements. The first deals with the security of programs. Even though programs are only data, special controls may be applied. Protection from unauthorized program modifications, a comprehensive set of testing and quality control procedures and sufficient backup to be able to recreate source code are all important.

The second aspect of data security is the traditional concept of integrity. Data

processing professionals have forever been concerned about the reliability of data. For years, simple as well as complex mechanisms have been used to help enhance this reliability. Such measures are exemplified by multi-step approval processes for system changes, procedures to insure data library movement controls, job input controls, internal qualitative or quantitative checks in application systems and separation of production from testing.

A security program will not undertake as its primary responsibility the maintenance of system integrity. However, many security measures, especially those related to processing controls, will enhance such integrity.

## Data Authorization

The final phase of data security is data authorization. This involves identification of system elements, including data, programs, devices, terminals and people. Resultant authentication of these identified

elements and the processing for authorization decisions are the key technical issues.

The system must know who is accessing

## Part VII Software Elements

its data. There are three possibilities. One is through the use of passwords, which are commonly implemented in most time-shared systems, including Multics.

IBM has a password facility in OS, but its use is extremely limited because it requires the operator to respond. There are also control problems in the maintenance and disposition of passwords.

The second identification possibility is through the use of credit card technology. Cards may have a magnetic stripe with encrypted identification information, magnetic contacts, mechanical contacts or other means to insure unique identification of the individual or class of

individuals.

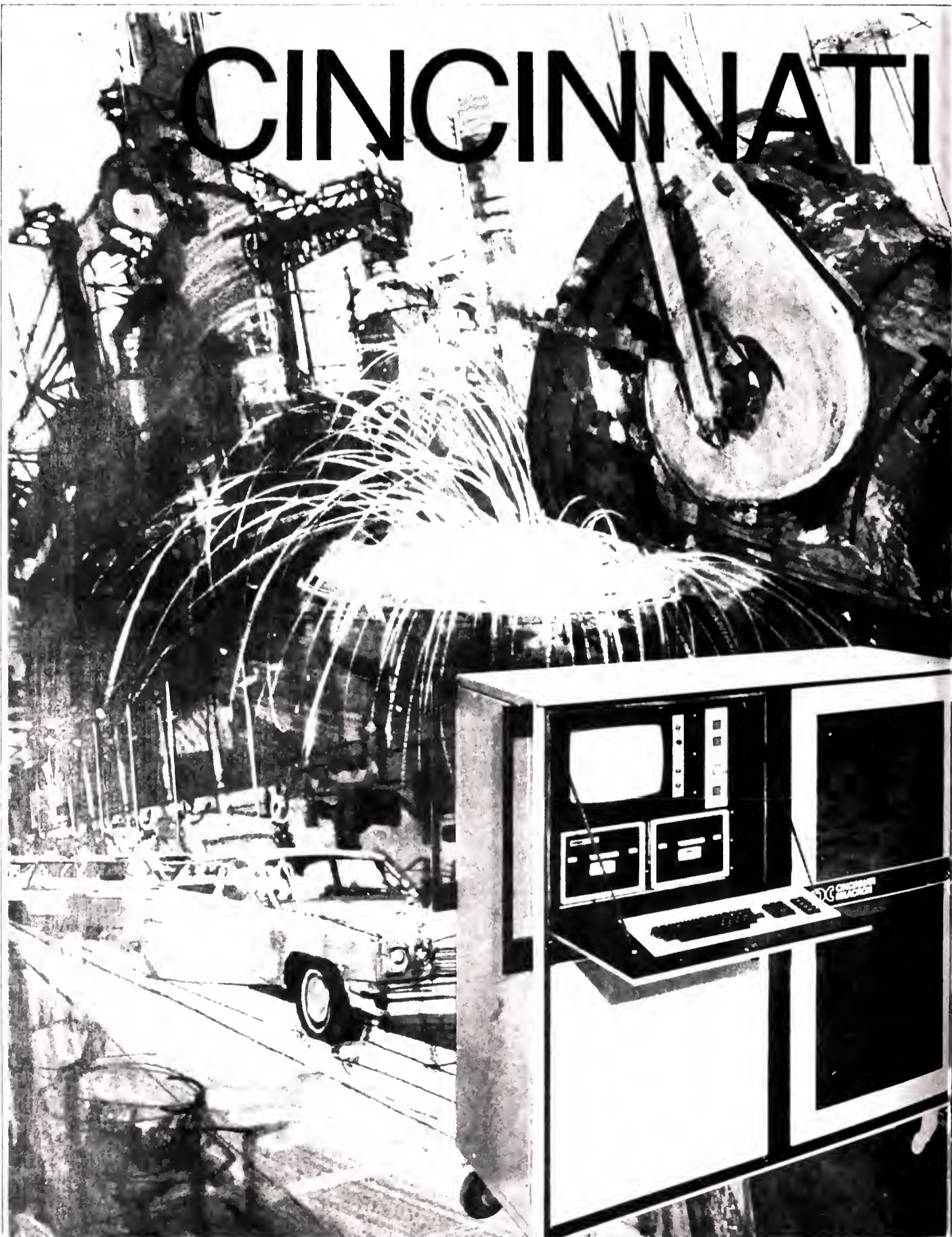
A credit card may also be lost or given away as with passwords. However, with close administrative controls, user education and a "rule out" capability to invalidate lost cards, this type of identification is quite usable, simple and flexible.

The third approach is to sense physical characteristics of an individual. Various devices that measure fingerprints, voiceprints or hand geometry are either commercially available or in the testing stages. The discrimination problem and resultant need to consume large system resources for authentication of the characteristics negates their present usefulness. As technology improves, this type of identification/authentication device will see increased usage.

The final part of this series will examine more detailed aspects of authorization and auditing.

Peter Browne is manager of the security operation, General Electric, Information Services Division, Bethesda, Md.

## Peter Browne On Security



## Experimental System Nabs Bank Robbery Suspects

NEW YORK An experimental law enforcement computer system that prescreens mug shots has aided in the apprehension of two suspects in a bank robbery.

The Miraquic computer system [CW, Sept. 26, 1973], in use in Queens since March of last year, picked out two individuals as suspects in a bank holdup and jewelry store robbery which took place Dec. 21, 1973. More than \$100,000 was said to have been taken in the robberies.

The Miraquic system consists of an optical scanner, microfilm retriever and a CRT screen and is used to identify fingerprints and mug shots. Witnesses to the robberies offered descriptions of the suspects and the computer searched for pictures with those characteristics, according to Inspector Edwin Dreher, chief of Queens detectives. As each mug shot appeared on the screen, each witness confirmed or denied that the picture before him was of a man involved in the robbery.

The suspects are now in jail, Dreher said, and no date has been set for a trial.

## Using Base of 28,000 Patients

# Mini Helps Diagnose Heart Disorders From ECG Data

WASHINGTON, D.C. — A series of probabilistic computer programs — using a data base derived from 28,000 patients — has outperformed a group of trained cardiologists in diagnosing heart disease from electrocardiogram (ECG) data.

Analyzing ECGs from patients whose diagnosis had already been confirmed, the system correctly identified a patient's disorder in 88% of the cases presented, while the cardiologists' score was 64%.

The programs were developed by Dr. Hubert Pipberger, who is associated with both the Veterans Administration Hospital here and the George Washington University Medical School, where he is a professor of clinical engineering and medicine.

The system was developed on a Control Data 3200 system and is now running on a Varian 73 minicomputer.

"Most of the people who have worked

with computer analysis of electrocardiograms have tried to use the computer to simulate a physician," Pipberger said. "But we've tried to see whether the computer can do better than a physician."

An ECG is a record of how the heart's muscle tissue is functioning. The contraction of a muscle — like the transmission of a nerve impulse — is essentially an electrical process. An electric impulse propagates through the muscle, causing its fibers to shorten. The ECG shows the electrical disturbances associated with the contraction of heart muscle, as recorded by conductors placed on the patient's skin.

"A typical ECG shows several distinct waves of activity during each heartbeat cycle. A record of these waves can provide considerable information about the heart's condition and activity."

Important diagnostic parameters include the amplitude and direction of the waves,

and the time interval between successive parts of the wave series. Abnormalities in the formation of the contractive impulse, delays in its propagation within the heart, and other anomalies can help a trained observer identify the nature, location and extent of many types of heart disorders.

The essential components of Pipberger's system are a three-channel ECG recorder, an analog-to-digital converter, the Varian 73 computer, and a package of programs that permits the computer to read an ECG and then identify a heart disorder by referring to a 28,000-patient data base.

This data base, stored on disk and containing clinical information on patients with known types of heart disease, has taken some 13 years to assemble.

ECG information from seven sensors attached to the patient is fed from the three-channel recorder to the A-to-D con-

verter. Within the Washington VA hospital, this transfer is hardwired. But ECG data can also come in over telephone lines from other hospitals that are cooperating in Pipberger's research.

The digitized information from the converter goes to the Varian 73, which first uses an automatic wave-recognition program to isolate and identify the individual waves within the ECG record.

Then a wave-measurement program takes over. This program determines approximately 350 features of the ECG wave series. The parameters considered are the amplitude and duration of each type of wave, and its direction in space (as determined by vector analysis of the signals).

The program determines these quantities at each of eight instants in time. Thus it records 24 items of information for each major ECG wave complex.

It also records data about heart rhythm, as well as various special combinations of measurements. For example, it might combine parameters of the two waves into a single measurement, or examine a particular wave in only two dimensions instead of three.

In all, some 350 measurements are taken, although many of them are redundant or without value. Only about 110 are unique and clinically significant.

This diagnostic information is then subjected to discriminant-function analysis, a form of multivariate analysis.

In this process, recorded measurements are used to develop a statistic that compares the measurements with the existing data about a particular disease. This is where the system's extensive data base comes into play.

Operationally, discriminant-function analysis involves combining wave measurements into multidimensional vector spaces. In analyzing a combination of three waves, for example, the program uses 66 dimensions. This sort of statistical work couldn't be done manually in so many dimensions, Pipberger noted.

The result of the discriminant-function analysis is a printed list of conditional probabilities that the patient is suffering from a given heart disorder.

It might, for example, tell the cardiologist that there is an 80% chance that the patient's right ventricular overload is due to a chronic pulmonary disorder, and that there is only a 6% chance that the overload is attributable to a diseased heart valve. The sum of all the probabilities listed must, of course, total 100%.

The cost-effectiveness of the system will be analyzed by an independent evaluation team later, and compared with the cost-effectiveness of physicians in identifying heart disease, Pipberger said. If the results are favorable to automated ECG analysis, it will probably become a regular clinical procedure in VA hospitals.

Besides evaluation of his present system, Pipberger is developing a data base on heart disorders in children.

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## Expo Ready for Anything

SPOKANE, Wash. The types and numbers of accidents and illnesses that might befall visitors to Expo '74 here this summer won't come as a surprise to the fair's public health officials — they received estimates from a computer and are planning their attack.

Expo public safety manager Bill Huff noted that a variety of data, including expected weather conditions, possible temperature ranges, number of visitors expected and information from past Expos, was run through a University of Washington computer.

Results indicated there might be 200 heart attacks, 3,100 cuts and scrapes, 300 burns and as many as 1,600 sprains and broken bones. The computer also estimated that at least 22,000 people will need some sort of first aid.



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## High-Risk Babies Watched

## Nurses' Tasks Eased

# Complex Monitor Setup Zeroes In on Premie Mortality

By Alexander Dumas  
and  
Toni Wiseman  
Of the CW Staff

CINCINNATI - The high mortality rate for premature babies may be lessened with a computer-aided project at the University of Cincinnati Medical Center.

The project consists of four basic parts: a monitoring system, two data banks, and a two-way telephone network linking the UC Newborn Division with nurseries in the surrounding area.

Dr. Paul Perlstein, a pediatrician at the center, said inadequate funds and staffing in hospitals and medical centers account for a lack of care resulting in 14 infant deaths for every 1,000 babies born in this country. Only a quarter of the 300,000 babies born in the U.S. each year with premature birth complications get the proper medical attention, he added.

"We have the skills and technology to cope with this problem, yet we're unable to wipe out the high mortality rate," he asserted.

Perlstein said this mortality figure places the U.S. 14th highest among the nations of the world in infant mortality.

The project, named Aleyon, was designed and constructed by Neil Edwards of the Newborn Division computer staff, and can handle as many as 1,200 babies needing special care each year.

The heart of the project is a monitoring system based on a PDP-11 20. The CPU stores vital information—such as heartbeat, pulse, respiration—collected from monitors in each of 12 incubators.

This process, Edwards said, replaces the nurse or technician attending each child and recording the vital signs.

On command, or automatically when the nursing rotation shifts, the computer prints out summaries of the infants' clinical records for the past eight hours.

Besides taking and storing the vital signs, the computer automatically adjusts the environment inside the incubator, raising or lowering the temperature to meet the baby's needs, Edwards added.

Perlstein pointed out that the object is not to remove the human skills altogether, because people still must make the life-

and-death decisions. "But the jobs the computer does free us in the incubation room to perform other tasks," he said.

The computer also handles a data bank of patient information enabling the center to detail the diseases the division is treating.

"It also lets us measure the success of what we do in general in our intensive care program," Perlstein said.

A second data bank relates to patient care, but not to patients specifically.

"It's kind of like a big com-

puter textbook," Perlstein said, "which also does calculations for us when we administer drugs or intravenous fluids, or have to treat patients in some way which requires a calculation."

The fourth component in the project relies on the computer while not being directly tied to it.

A hot-line two-way telephone network permits other nurseries in the area to phone in for information essential to the care of newborn babies. Only division personnel, however, can access

this information, which is then relayed to the nursery.

The system is not on-line to other institutions, Perlstein explained, because "we don't like giving out such information to 'unaware users,' if you like, without it being annotated."

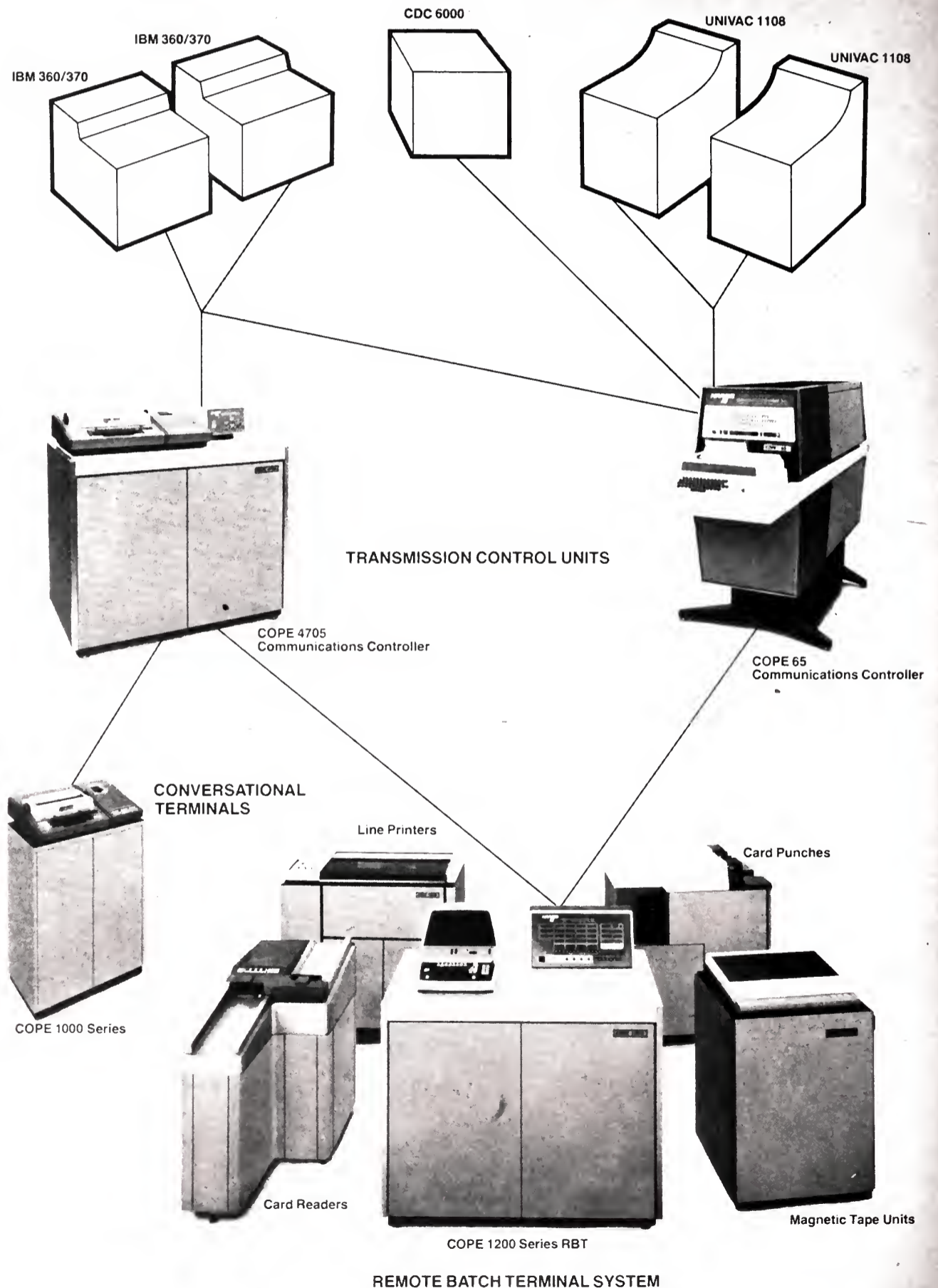
### Expansion Seen

Even though original funds for the project are exhausted, hopes for the expansion of the system to the region around Cincinnati continue because of a \$400,000 commitment from the U.S. De-

partment of Health, Education and Welfare for the next four years.

While the Newborn Center currently serves Southeast Ohio, it hopes to provide its service to the surrounding areas of Kentucky, Indiana and West Virginia.

The HEW grant does not provide for system revisions or additional hardware, but Edwards indicated he wants to rework the Aleyon program, with hospital and state funds, before it is used in other regions of the country.



## DP Has the Floor

WHITEVILLE, N.C. - A computerized system was recently installed here in hopes that it would speed production in the local rug industry, and it now literally has the floor.

Until January, the Karastan Division of Fieldcrest Mills, Inc., could produce about 12,000 square yards of multicolored carpet a week using standard loom procedures.

Now, the weekly production runs as high as 25,000 square yards with the arrival of the Bondi rug designer, named after its Italian inventor, Emanuele Bondi.

The machine uses a computer to "scan" a carpet design and select the properly colored yarns that go into the right sequence to form the rug pattern.

# Introduction of DP Into Firm 'Not End in Itself': Davis

DALLAS — The introduction of computers and telecommunications into an organization should not be "an end in itself," according to Dr. Ruth M. Davis, director of the National Bureau of Standards Institute for Computer Sciences and Technology.

"One lesson that has been learned about innovation and diffusion of ADP and telecommunications technology is that they can be better understood when they are considered as a portion of a process or change," she recently told the Federal Executive Board's Telecommunications Seminar here.

"In other words," she added, "the application of ADP or telecommunications technology is generally just one part of a process of change in management or operations or a service function."

## The Big Picture

It is "technological suicide," she said, to introduce computer or telecommunications equipment into one part of an organization without considering the effects of that change on other parts of the process.

One of the essential considerations in planning for the innova-

tion and diffusion of computers and telecommunications is standards in the area, Davis declared.

At the same time, she noted, two different types of standards have to apply to all such efforts — those governing the technology and those on the application itself.

The applications standards can be developed by the organizations using computers themselves, she said, while standards on technology "usually have to be developed by an organization separate from the organization" responsible for the application.

"They are usually developed

by an organization that has some degree of responsibility to the industry involved, the technology and science involved, and to the customers," she said.

But to date, she said, "standardization has not yet occurred, however, with computers and services," and therefore "it is not surprising then to find that automation in government services is not yet progressing in step with its potential."

The best time for the development of standards in an industry, Davis declared, "is when diffusion of a successful application of technology is about to begin."

"Standards adopted at a time much later than this most usually become simply the adoption of de facto standards recognized and in-being within industry. Such standards do not serve well the customer for services or products."

However, Davis noted, standards adopted earlier "usually tend to stifle the development of technology and often do constrain certain technologies in favor of other technologies."

"And so," Davis stated, "one of the most important tasks at this stage in the utilization of computers and telecommunications by federal, state and local governments is that of timing technological standards-making to that of the diffusion of a successful innovation or a particular application of automation technology."

To do this, she recommended cooperation among different agencies on a functional basis to adopt applications standards in such areas as law enforcement, health insurance, medical applications, welfare, air traffic control and mass transit.

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## Reservoirs Figure In Flood Control

COLUMBIA, Mo. The damage caused by floods may soon be minimized with a method of regulating reservoirs to optimize flood control.

Dr. Allen Hjelmfelt of the University of Missouri-Columbia and a graduate student have developed a mathematical optimizing technique, using linear programming, in order to minimize use of flood storage space, or maximize flow downstream.

Input data includes reservoir flood capacity, channel capacities downstream, time for water to get downstream, release capabilities of reservoirs and expected inflow into reservoirs by time increments.

The object of his research, Hjelmfelt stated, is to keep a minimum of water stored in the reservoir, while determining the highest possible flow-rate downstream without flooding.

The technique has not yet been tested in a real crisis situation, he said, but had been tested in a hypothetical model based on flood data collected on a portion of the Kansas River.

The program, he said, is laid out and operational, but at the moment it encompasses only the three reservoirs used in the test model. There are some 20 reservoirs located on the river.

"However," Hjelmfelt said, "the program could be expanded to control the entire reservoir system at any time."

## Court Gets Traffic Cop

COLUMBUS, Ohio A computer will "direct traffic" in the Franklin County Common Pleas and Municipal Courts next year.

Attorneys, clients and witnesses will be scheduled for and given advance notification of court appearances. At the same time, judges and attorneys will be able to instruct the computer not to schedule them for duty if they have previous commitments.

The computer's applications may be expanded, in the future, to predict the probability of a case going to jury.

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## 'Fantastic Economics' Missed

# Users Seen Lagging in In-House Technical Training

By Molly Upton  
Of the CW Staff

CINCINNATI — Computer users are about 20 years behind the times in using in-house technical training, John Rose, supervisor of technical training for the glass division of PPG Industries, Inc., said recently.

"The economics of in-house training are fantastic," he claimed.

"While a \$3,000 packaged course might seem expensive, the cost can easily be justified by comparing it with the ex-

pense of sending personnel to sessions conducted out of house, which usually averages \$725 per student including room and board, Rose noted.

### Three Generations

There are three generations of computer training, and all have failed to answer the need, he said.

First there were courses offered by equipment vendors. They tended to be sales pitches, not particularly relevant to the attendees, and the classes were

comprised of people with a wide range of backgrounds.

The second generation was the in-house course without an instructor. Rose said he feels this type is a failure. "It is poor economics not to use an instructor start and finish; otherwise they tend not to complete a course, he said.

Not only is the opportunity for student interaction minimized if each views films or reads books on his own, but in one six-hour course, it takes an hour to change the audiovisual aids.

Having 33 individuals go through the course separately translates into 33 man hours lost, whereas with an instructor it is one hour, he noted.

Rose recommended the eclectic approach, and selection of the best available courses.

A few years ago there was a dearth of material available, but now the user has a wide selection, he said.

### Good Friends

The problem is to keep vendors in business "because if we get where we should be in using in-house training, we'll need them around," he said.

To develop its courses, PPG uses the best video courses, its own instructors and transparencies supplemented with the 16mm film.

It produces its own student texts, tailors the course to PPG, and has the students give critiques of the course.

In addition to training the technical personnel, which is generally acknowledged as the technical department's task, the real question is who is responsible for training the users in other departments, he said. These need familiarity with the system also.

PPG has four standard courses for users: computer systems, computer programming, fundamentals of finance and accounting and the systems approach, Rose said.

At PPG, candidates are hired just out of college and enrolled in the controller training program, where they attend about 10 different courses intermixed with on-the-job training in both the financial and systems areas.

## In-House Plans Get Solid Praise

CINCINNATI — The virtues of in-house training also received a boost by the four panelists at a data communications session of the Computer Caravan here.

Each of the panelists' shops uses in-house training, and they noted this allows them to hire recent college graduates and train them the way they want, "without preconceived ideas," one noted.

At Goodyear Tire and Rubber Co. college graduates go through the firm's financial training program, Jim Evans said.

The Hamilton County Regional Computer Center needed Assembly Language programmers and turned to in-house training, observed Bob Herbert.

### Hard to Find \$

The Southwest Ohio Regional Computer Center (Swocec) also trains in-house, as it is becoming increasingly difficult to procure funds for outside education from the administration.

Swocec primarily uses standard software and tries to modify it where necessary.

Norman F. Petterson of Cuyahoga County data center said his installation also primarily uses in-house training. He noted the staff has been there an average of eight or nine years, and attributed the high rate of retention to hardware upgrades, which "provides challenge."

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## Small User Contemplating Cards Would Do Well to Think Disk

CINCINNATI - A user contemplating a System/3 card configuration would do well to evaluate his future needs and possibly install a disk system, according to Gary Salins of King's Island Amusement Park.

Many users go to a disk system in 12 to 14 months anyway, he said. Avoiding the conversion will eliminate some headaches and enable the user to take full advantage of the disk system, he added.

"It is very unfortunate that the IBM salesmen say conversion is easy," he stated.

In addition, a user cannot really take advantage of the disk system using software developed for the card system without recompiling. The two use different types of file structures, he observed.

One problem often faced by S/3 users, he said, is the lack of knowledge of software and hardware shown by IBM service personnel.

### Training Ground

IBM uses the small systems area as a training ground, and some individuals are not that familiar with the system, he said.

Hopefully the recent restructuring of the General Systems Division will improve matters, he said.

A few techniques that Salins used at King's Island to improve the S/3 operation were to multiblock and double buffer, he said.

Forms design can also be a significant aspect of systems operation in the smaller shop, he said.

Reducing from eight to seven the number of lines to be printed on paychecks, for example, helped save about half an hour on the weekly payroll run for 2,700 paychecks, he said.

At King's Island, the files are not up-

dated while a report is being printed and vice versa. This might sound inefficient, but Salins explained that it offers him a better chance of recovering from an error.

Also, any file put to printer costs core, as do updates. Running them concurrently causes overlays, which slow things down. In addition, performing these functions separately prevents the necessity of restart or backup if paper jams, he said at a recent Computer Caravan here.

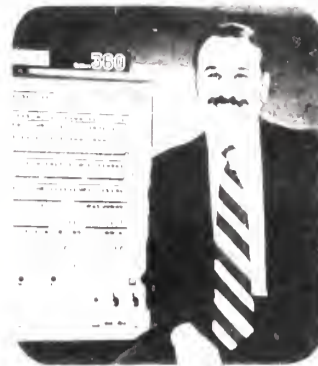
### Scheduling Help

Scheduling also helped improve efficiency. "Although it's often not easy in a small shop to educate the user that the DP department is not going to stop one job to put on another," it does help, he said.

Scheduling weekly runs and asking users for advance notice of jobs has reduced turn time considerably and improved service, he commented.

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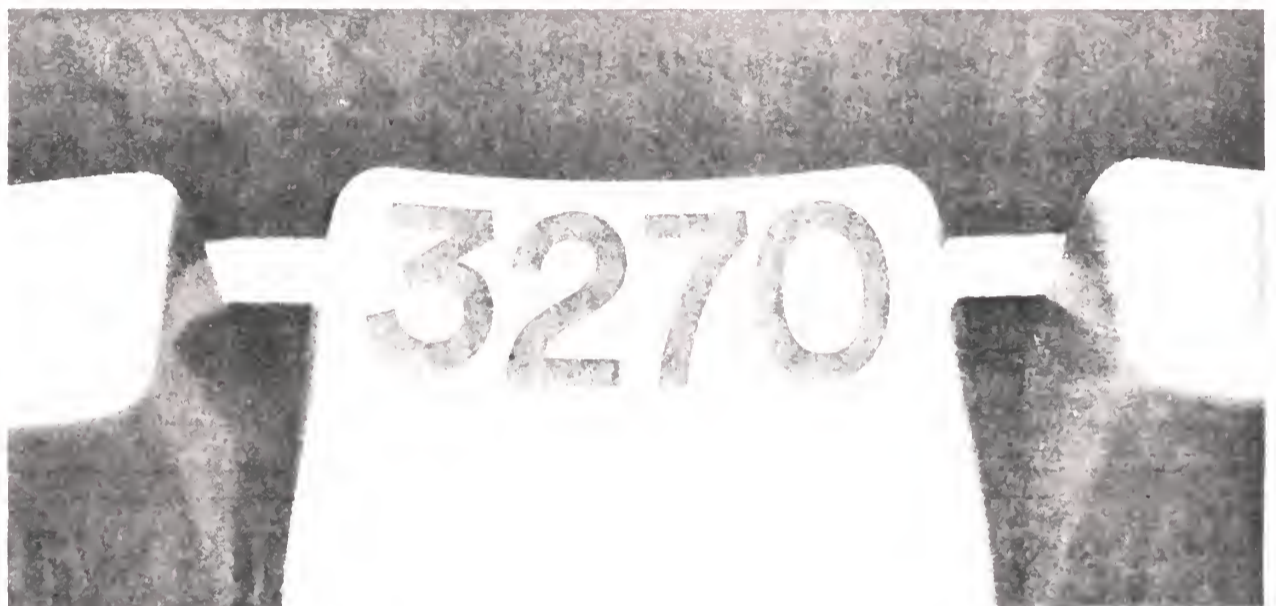
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## 'Caps' to Ease Retarded Placement

BELLEVUE, Ohio — The placement needs of mentally retarded people are being addressed by a new computer-aided placement service (Caps).

Caps was designed to provide an optimum match between facility services and applicant needs.

A data bank on institutions is currently being built, according to William R. Thompson, vice-president of Medical Datamation Inc., which offers the service.

"We'll need a minimum of 400 to 500 institutions in the data base before we begin processing applications," he said, noting that there were some 4,000 institutions for the mentally retarded in the U.S.

The data bank is being compiled through mailings of questionnaires to the various institutions, private ones at first, but later public institutions will also be added, Thompson said.

Thompson described the questionnaires for applicants and institutions as "mirror

images," both concerned with answers on patient needs, finances, location, size and goals (i.e., reeducation, training, custodial care).

The applicant's file will also contain a medical history and summary of unique traits. This information, according to Thompson, will be used to prepare a resume which the family can use in making initial inquiries to the facilities.

The facility information will be stored in the computer. The applicant questionnaires are computer-processed, and a ranking list of the six facilities which best meet the needs of the applicant will be sent to the family.

Thompson expects the system to be running by April 1, but said it depends on how long the institutions take to send back the questionnaires.

"We know that parents are interested," he said, "we've already received several patient applications."

## Crime Prediction Practiced Here

JACKSONVILLE, Fla. — Would-be robbers and burglars here better think twice before they act, because the city's information systems division is concentrating on predicting the location of such crimes by computer, and the operation has been successful so far.

Information officer William Calcagni said the "second-guesser" is a Burroughs B3500 that can help speed police to crime locations as well as predict crime locations.

The system is presently being used just for burglaries and robberies, but with a conversion to a B6700 imminent and another federal grant expected in April, he said his department will develop a crime pattern prediction program cover-

ing every possible offense.

The computer stores all information from past crimes and can provide the police with "probability factors" as to where similar crimes might occur.

The present system, he said, minimizes the time between the phone call reporting the crime and the police arriving on the scene.

The computer is fed information from the caller, and the address of the caller and the location of the alleged crime are verified. The system then determines in which zone of the city the crime, if any, is occurring, and a printout tells the police dispatcher which police cruiser is closest to the incident.

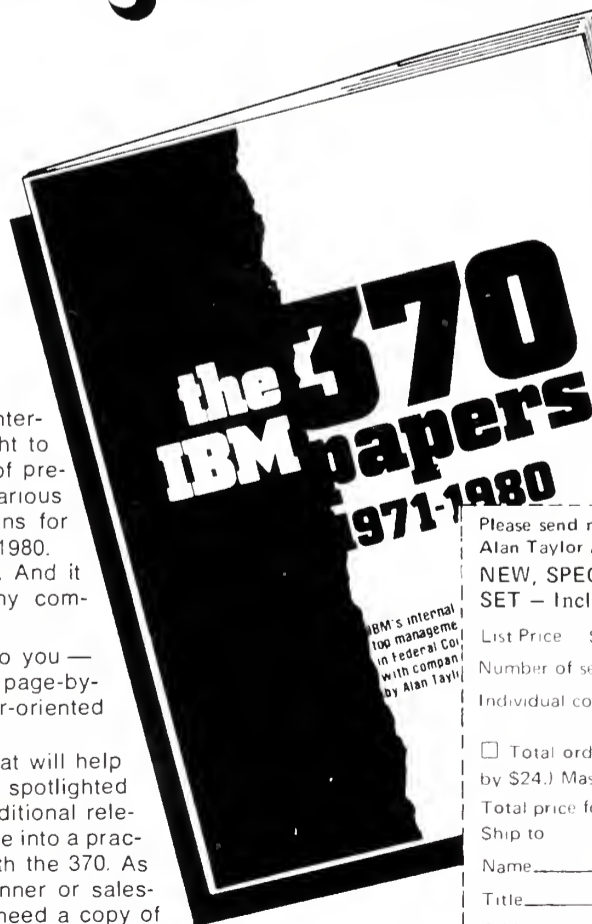
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- IBM's plans for the 'death' and replacement of 370 models — and data about their successors. (A unique feature that everyone should read and understand.)
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## COM Aids Cops in Print Match

DALLAS — A computerized microfilm retrieval system gave police here the break they needed recently, helping to end a 13-day search for a man suspected of shooting and robbing local grocery store operators.

Operated by the Texas Department of Public Safety in Austin, the Kodak Microcode system identified Jesse Ray Jones who was subsequently arrested and charged with robbery and murder.

Working from a single fingerprint delivered by the police on a Friday, the system matched the fingerprints of Jones in its files by the following Wednesday.

"We probably could have found this subject's fingerprints by manual search," Asst. Police Chief Don Steele said, "but I'm convinced that if the retrieval system hadn't made the identification so quickly, this guy would have stayed loose longer, which might have led to some other folks getting hurt."

In addition to classifying and matching fingerprints, the system is also program-

med to match offenders with modus operandi.

Physical characteristics and other information on known criminals can be fed into the system and easily retrieved, a department of public safety spokesman added.

## Artists Give DP A Vote of Confidence

PITTSBURGH — The idea that a computer belongs only in the areas of science, technology and business is a limited view — what about the cultural side of those huge masses of steel and circuitry?

To help debunk this idea, the Associated Artists here are using punch cards to aid the voting at their annual exhibit next month.

They hope this will speed the task of judging the merits of between 400 and 600 entries. In addition, Eugene Kravits, association president, hopes the computerized voting will get the judges out of the normal "voting rut."

The cards will be processed free by the Control Data Institute of Pittsburgh.

## Monk Challenges DP

BANGKOK, Thailand — A Buddhist monk here has issued a challenge to any computer which cares to take him on in a calculating contest.

Sialeng Sae Sim, who claims only a fourth grade education, says he has developed a secret method of rapid calculation which permits him to solve an average mathematical problem in three minutes and challenged any computer to do better.

"I will welcome any of the computers," he said. "I just want to prove who is superior."

## TERMINALS REVIEW

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## CI Notes

### Greyhound Appeal Planned

SAN FRANCISCO -- The Circuit Court of Appeals here has set April 10 as the date for Greyhound Computer Corp. to argue for a reversal of a lower court decision dismissing its antitrust suit against IBM.

The Greyhound case was the first of the current round of antitrust suits against IBM to come to trial but was dismissed before IBM presented its defense after a 10-week trial in 1972 on the grounds that Greyhound had not proven monopolization.

### Key-to-Floppy Disk Area Attracts Interest

Control Data Corp. and Data 100 Corp. are both reportedly pondering entry into the key-to-flexible-disk entry market. Data 100 expects to introduce its unit, which will be compatible with its terminals, at the National Computer Conference in May.

### Wang Orders Memorex Floppies

SANTA CLARA, Calif. — Memorex has received a contract valued at about \$2 million to provide Wang Laboratories with its 651 flexible disk drives and accessories.

The non-IBM-compatible units will be used in the Wang System 2200 computer and Series 600 and 700 programmable calculators.

### Data 100 Sets Leasing Pacts

MINNEAPOLIS — Data 100 has signed a preliminary agreement with two leasing firms for the sale of up to \$15 million of its equipment, which the firms will lease to Data 100 customers.

Under the terms of the agreement, St. Paul Leasing Co. and Associates First Capital Corp. will purchase the units over a 12- to 18-month period. The transactions will be recorded as sales.

## Supershorts

Orbis Systems, Inc. has signed an OEM agreement with Remex for floppy disk drives. Remex will market the units to the small and medium OEM buyer; Orbis will concentrate on the large buyer.

Computer Automation, Inc. has appointed Computer Advances (Pty.) Ltd. as distributor in the Republic of South Africa.

General Automation, Inc. has received approval from the Japanese Government to form a 50-50 venture with Koyo Electronics Industries Co., Ltd., Tokyo, for development, integration and sale of automated systems in Japan. The new company is called Koyo General Automation Ltd.

## '74 the Turning Point?

# EEC Urges Development of European DP

By E. Drake Lundell Jr.  
Of the CW Staff

PARIS — This year may be the turning point for the European computer industry, as the European Economic Community pushes increased research support, standardization and common purchasing policies.

The moves are being supported by the highest levels of the EEC and are aimed directly at reducing the European dependence on U.S.-made data processing equipment, which could spell trouble for U.S. manufacturers abroad.

The planned actions are significant since they would move European support for

the computer industry off of a national basis and would pool the finite resources of the EEC behind the development of an indigenous industry.

A recent report from the Commission of the European Communities called for concerted EEC action in the area of DP this year in order to overcome American dominance of the industry by 1980.

"The very structure of society may be determined in the future by the way it uses information systems," the report noted in pointing out the need for a strong local industry.

Over 90% of the present computers installed in Europe, the report said, are based on American technology with 60% of the European market "held by a single dominant firm based outside Europe (IBM)."

But at the same time, the report warned, the commission "will be vigilant to ensure that there is no abuse of such a dominant position," noting that IBM's "position enables it to determine the pattern of prices and standards, to dictate the pace of commercial innovation and the pattern of the market."

In order to ensure competition with IBM and the other American firms, the report said "the time has come to move on from national procurement policies to a close collaboration at Community level in procurement."

"This must be designed to support rationalization and standardization, to achieve greater economies for the users, through joint purchasing and development and the construction of common networks or services."

In addition to common purchasing policies designed to promote standardization among the countries in Europe, the report also proposed undertaking "in common a small number of major applications development projects of an international character."

The commission should come up with detailed plans for these projects by the end of this year, the report noted, and such projects "will provide a stimulus for collaborative effort by the European industry without being dependent on any particular industrial structures."

The report also asked the commission to study the possibility of common European support for collaborative developments.

And effort must be made, the report said, to "move on from the limited collaborating that is possible in the immediate future to a systematic program for the development of European data processing which would provide a framework for future financial support."

At the same time, the report urged that the program developed to strengthen the European industry be made in such a way to ensure that the growth of the industry is distributed throughout the nations that make up the EEC.

## Adapso Asks Federal Reserve To Review EFTS Consequences

NEW YORK — The Association of Data Processing Service Organizations has submitted to the Federal Reserve Board a position paper calling upon that group's board of governors to launch an immediate and aggressive inquiry into the economic and social consequences implied by the development of the Fed's proposed electronic funds transfer system (EFTS).

"Adapso's interest in EFTS stems from its concern with an improperly designed system that may further exclude non-bank-affiliated FDP service organizations from the FDP marketplace, creating anti-competitive effects and the potential for adverse consequences to human freedom," stated Jerry Dreyer, executive vice-president.

Adapso outlined several factors that should be taken into account: personal privacy, absence of discrimination, possible anti-competitive effects, national catastrophe, and human frustration.

### 'Tip of the Iceberg'

"Adapso suspects that the foregoing concerns are only the tip of the iceberg, and that the thorough FRB inquiry it proposes would uncover perhaps even more serious issues," the paper stated.

If a general inquiry is not conducted into the effects of EFTS, Adapso asked the Federal Reserve Board to prepare and circulate the statement required by the National Environmental Policy Act, which would "identify the important considerations involved, thereby making possible whatever legislative or judicial remedial action might be indicated."

On the subject of personal privacy, Adapso stressed the necessity of guidelines to insure that "only needed and proper information is accumulated in the EFTS system, and that such information is disseminated only by those entitled to it."

The paper noted that credit cards have been withheld from certain groups by the issuing agency.

It urged that "appropriate criteria expressed in regulations are necessary to prevent discrimination when EFTS reaches its full development."

Lawfully promulgated standards "permitting rapid and easy coupling and un-

coupling between units in and out of the EFTS system" are needed, it said.

Measures should be taken to prevent a completely interdependent economic grid in which a breakdown of a part could impair the whole, Adapso warned.

On the subject of human frustration, Adapso alerted the FRB that EFTS could "compound by orders of magnitude" the frustration of being unable to obtain understanding response when dealing with a computer system.

"Measures for human interaction must be included in any regulatory framework," the paper said.

## Bunker Ramo Charges IBM With 7-Count Patent Infringement

OAKBROOK, Ill. Bunker Ramo Corp. has filed a complaint against IBM charging the firm with a seven-count infringement of its patents.

The patents allegedly infringed include computer control and display apparatus and memory and memory transfer apparatus used in IBM 360s and 370s and in its 2250 display.

"IBM does not infringe Bunker Ramo patents as charged in their suit," an IBM spokesman said.

"Furthermore, since the IBM products cited as infringing have all been on the market for several years, and since Bunker Ramo has never raised this point before, we believe the suit is without substance," he added.

Bunker Ramo charged IBM with infringing patents that range from an overlay sheet for use in association with a keyboard to a patent on a modular computer system using symbolic addressing of peripheral units.

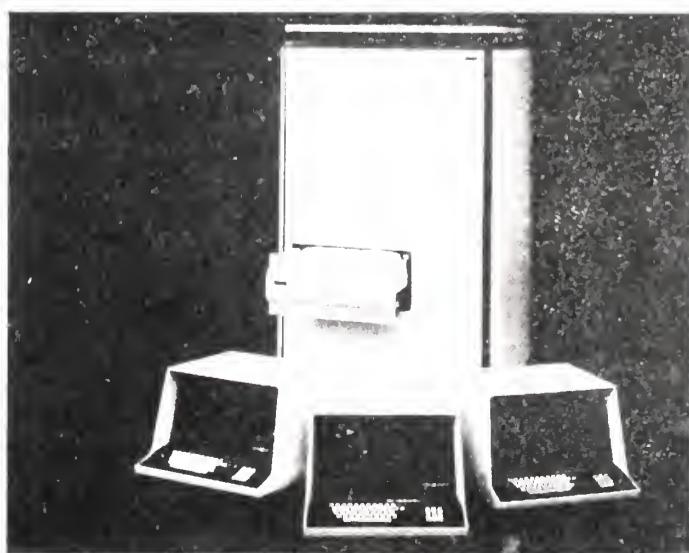
Other patents allegedly infringed pertain to controlling the sequence of instructions or data from memory by modifying operand addresses, transferring data between slower and faster memory to reduce the overall accessing time, and speeding up the transfer of data between a sequential access memory and a random access memory.

## The cost of remote data collection just became news.

Sanders' 8100 Remote Batch Terminal System can promote remote-site data entry savings from all angles. The programmable, clustered 8100 system offers 5-megabyte disk storage, source-document screen formatting and broad error-checking/editing. It eliminates card-punching, reduces CPU line charges. It simplifies, controls, standardizes, improves turnaround. The 8100 is still another answer from Sanders technology rooted in unequalled terminal-industry experience. We have the hardware, software, maintenance support — and proven reliability. Sanders Data Systems, Inc., Daniel Webster Highway-South, Nashua, N.H. 03060. Call (603) 885-3727.

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# THE FORUMS

## user-to-user in '74

The Computer Users' Forums give you a unique opportunity to exchange information with other users and independent experts about current practical problems. Forums run from 9:00 A.M. to 2:30 P.M. each day, including an opening report, panel discussions, morning and afternoon workshops and luncheon. If you register in advance for the User-to-User Forums, you'll save \$5 per day from the price at the door. If you attend all three days, you'll save \$15, just for acting early. (Note that no advance registration is required if you attend the Exposition only).

### Here are the Forum topics for '74

- First Day

Source Data Automation Today  
with workshops on  
Point-of-sale, Intelligent Terminals,  
Optical Scanning and Off-Line Key Entry
- Second Day

Data Communications Update  
with workshops on  
Network Planning, Front-End Processors,  
On-Line Systems and Equipment Selection
- Third Day

Operations Management  
with workshops on  
Performance Measurement, Project Control,  
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Each day, an important, current topic is discussed in an open afternoon session at 2:45 P.M. — free to all Caravan attendees. In 1974 we'll be looking at:

- FIRST DAY — Personnel
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If you'd like to attend The Computers Users' Forums, just fill out the registration form and send it in as soon as possible. Remember, advance registration for the Forums saves you \$5 per day. If you wish to attend only the Exposition, no advance registration is required. Just mark your calendar for the city and dates you want to attend and come to the location indicated in the complete schedule.



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- ☐ Second Day —

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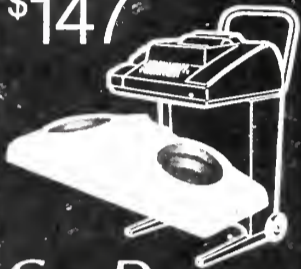
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## CW Inquiring Photographer Finds

# Mini Makers Optimistic for '74

By Molly Upton  
Of the CW Staff

WASHINGTON, D.C. The year 1974 looks like an even better one than 1973, several mini makers said here recently. Sales of some firms are well ahead of last year's rate despite the somewhat uncertain economic picture, and some even cited the energy crisis as a factor in increased business.

"With energy costs going sky high, it pays to automate," said George McFarland, district manager of General Automation, Inc.

"The year 1974 will far surpass 1973," McFarland predicted.



McFarland

Currently, GA has done twice the dollar volume of business compared with the same period



C. Photos by M. Upton

Mele of 1973, and is right on schedule for its 1974 goals, he said.

### HP Ahead of Last Year

Hewlett-Packard is significantly ahead of last year in terms of dollar volume, reported Ralph Mele, Jr., district manager for HP. Sales of the big ticket 3000 have helped, he admitted, and added that several customers have ordered a second 3000.

Other factors that have helped increase HP's sales are the split between OEM and end-user markets and HP's systems approach, he said.

Interdata is looking for a 60% growth in 1974 over 1973, observed John Belt, senior systems analyst.

Interdata is moving from its ratio of 65% OEM and 35% end user to a 50%-50% split. From a \$20 million company now, Interdata is aiming to be a \$76 million company in 1976, said Belt.

With the increased emphasis on the end-user market, Interdata is beefing up its sales and customer engineering staffs by 100%, he added.

The outlook is "healthy" at Texas Instruments, commented Jerry Taylor, systems analyst.

At NCC, TI will introduce the DX 980 disk executive multi-programming operating system, and a 3330-type disk with a capacity of 2M words (16-bit words) to hang on minis, he added.

### Energy Crunch Helps

The energy situation is "making more applications feasible now," added H. Rumph, Southeast regional manager of Cincinnati Milacron.

For example, he said, motels are using minis to monitor energy consumption, and selectively turning off heat or air conditioners for a period of time to

keep the monthly usage under a preset limit.

Some utilities are using Cincinnati Milacron minis and remote sensors to monitor fuel use in vehicles, he said.

Cincinnati Milacron's business is split about evenly between the process control market and the commercial DP segment, he said. The firm expects to see increases in the latter area, he added.

GA's McFarland noted firms are now using minis to automate boilers, whereas before the energy crunch, this application was often not considered.

GA has split its marketing force into two groups: business and computational sales and industrial/automation and OEM sales. This move is designed to



Belt

help the firm further penetrate and develop each of these market segments, he said.

GA plans to have several new products by May at NCC.

GA's program of having service bureaus market its 18/30 is progressing, with one service bureau, Coastal Data Services of Miami, already participating. This program allows the user to have his own system, but with support from his service bureau. When he needs to revert back to the service bureau, it will be familiar with his needs and programs.

Some firms, however, were not looking to the energy crisis to increase their markets, but noted they had not seen any ill effects either.

### No Ill Effects

S.J. Gaal, marketing manager for processor products at Data General, said the market was "as strong as it's ever been," but declined to make any projections.

Data General has seen no effect of the energy crisis, he said, adding he suspected some new mar-



Rumph

kets would open up.

While generally optimistic, Robert J. Vansteenbergh, regional systems analyst for Lockheed Data Systems, mused that it could be a toss-up.

Although the general economy is conducive to the DP industry, there might not be so many processes that need controlling, if the energy crisis becomes worse, he said.

### Overseas Orders

Most of Lockheed's orders for systems used in process control are coming from overseas, he noted.

Lockheed's three products are aimed at different market segments: the Sue for OEM, high technology areas including scientific-oriented applications requiring multiprocessing, and message switching, and the Mac for process control. The System III is a business machine that Lockheed sells to systems houses which then design the software for specific market segments.

The process control is a "steady business," but Vansteenbergh sees the small business area using System III as the fastest



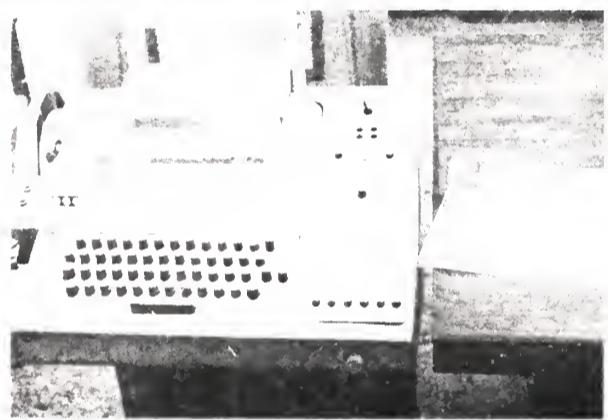
Vansteenbergh

growing of Lockheed's market areas.

John J. Dugan, regional manager of Modular Computer Systems (Modcomp) said the firm's traditional market of measurement and control is growing, but the communications area is outpacing it.

Modcomp is selling machines for front ends, high-speed concentrators and message switching applications.

"The communications part of Modcomp's business should triple from 1973," Dugan predicted.



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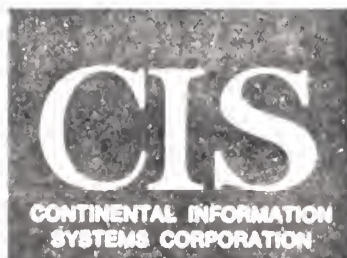


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#5 Delivery	5/17/74
#6 Delivery	5/17/74
#7 Delivery	6/21/74

### 370/168 Model K

#1 Delivery	4/19/74
#2 Delivery	5/17/74
#3 Delivery	6/21/74

## Pertec Lands Over \$4 Million In Orders From Foreign Firms

CHATSWORTH, Calif. — Pertec Corp. has recently landed orders valued at over \$4 million from several foreign firms.

A \$3 million, two-year contract for tape and disk drives for use in data entry systems was received from Facit-Addo, a subsidiary of Stockholm-based Electrolux, AB.

Two British firms have submitted orders for tape drives and formatters with a combined value of over \$1 million.

Redifon Electronic Systems will use the drives with the Redifon Seecheck, a key-to-disk system.

Plessey Telecommunications Ltd. will use the drives with several products, including an automatic library system and a stock control system which are marketed in the U.S.

About 30% of Pertec's Peripheral Equipment Division's production currently is being shipped to European markets, according to John North, general manager.

### Other Contracts

ECRM, Inc. has received a contract from Intertype Co. for its 5000 Series OCR equipment which will be incorporated into Intertype's composing room systems.

Advanced Computer Techniques Corp. has been awarded a contract for technical support services in materials management by the Imperial Iranian Air Force.

Systems Architects, Inc. has received a contract from the Department of Health, Education and Welfare for a study to pro-

## Contracts

vide the basis for determining the policies governing the design, implementation and control of data communications facilities. SAI will survey current and future needs of seven agencies of HEW.

Corporation S has signed a contract with Braniff International to read and record on magnetic tape selected information from airline tickets and other documents.

An optical character reader system will record information on tape at the rate of 900 document/min and will physically sort the documents into 32 categories.

## Expansions

MSI Data Corp. is transferring its production organization to a 47,200-square-foot facility at 335 Baker St., Costa Mesa, Calif.

Decision Data Computer Corp. has nearly doubled the size of its headquarters and manufacturing facility with the addition of a 60,000-square-foot expansion.

Modular Computer Systems, Inc. has begun construction on a 40,000-square-foot addition to nearly double its development and manufacturing facility.

Control Data Corp. has broken ground for a 94,000-square-foot manufacturing and assembly plant in Washington's inner city.

DynaStor, Inc. has opened a 20,000 square-foot manufacturing facility in Denver.

University Computing Co. has opened a commercial computer services center at 888 N. Sepulveda Blvd., El Segundo, Calif.

Digi-Log Systems, Inc. has opened a western regional sales and services office at 10408 Canyon Ave., Northridge, Calif.



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## What's The Outlook For The Computer Industry In

# JAPAN

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- Will the relaxed restrictions on Arab oil supplies to Japan and the fact that Japan has exempted data processing from oil restrictions mean no cut in computer activity?
- How about the impact on mainframe makers? Investment restrictions? Japan's credit squeeze? Power cuts? Effect on computer production? Commodity shortages? Replacement demand? The effect on Japan's economy? U.S. imports and exports from and to Japan? What it all means to YOU?

## EDP Japan report

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Model 302F—replacement for 103F. Private line and 1000A. CDT DAA applications... **\$245**

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# Small Firm 'Goes Multinational' in Ireland

By E.M. Hargreaves

Special to Computerworld

CORK, Ireland - Sooner or later, with competition and changing states of home markets, every corporation must face the possibility of selling overseas, of going "multinational."

It is a frightening prospect for many reasons. For one thing, it involves starting up manufacture in a foreign land, with lack of sufficient knowledge of conditions and with the fear that some element of control will disappear.

Hundreds of American companies have opened plants overseas (mainly in Europe) and companies from other lands have opened up in the U.S., and there is a wide suspicion of multinational companies.

Many of the bigger firms have annual budgets in excess of those of many of the smaller states and the latter are afraid of losing sovereignty.

Trade unions fear the effect on their workers of foreign-based headquarters making decisions which will mean the loss of jobs, and since President Nixon introduced his controls a couple of years ago, there has been more talk of "exporting jobs" from America.

However, unless there is a dras-

tic world change in economic systems or unless some new political creed emerges which will put "internationalism" at the top of its priorities, the "multi-

## International News

national" company is the pattern of the future.

Already, the U.S. computer and electronics industries have moved in this direction by setting up facilities in Europe and the British Isles to overcome tariff and other barriers in the European Economic Community

and to take advantage of the British world markets and exporting know-how.

### Not All Giants

Many of these companies are quite small. One of the latest to make the venture is Nuclear Data, Inc., the Palatine, Ill., manufacturer of computers, and specialists in the development of research and testing systems for nuclear radiation and medical diagnosis.

Nuclear's first move in direct overseas manufacturing came in July 1970 when with total annual sales of \$9.6 million it set up a 15,000-sq.-ft. factory at

Cork in the Republic of Ireland.

Today that company employs 45 people, most of them trained locally, on a production program which specializes in the manufacture of computer-aided instruments for testing nuclear radiations in medical and other systems.

Nuclear Data also operates sales offices in London, Frankfurt, and Malmo, Sweden.

The company's officers studied other locations before finally deciding on Ireland. The final choice was made principally because there was available labor, financial attractions and no language barrier.

## UK Mini Costs Up, Pound Blamed

LONDON - The prices of minis are going up in the UK and the pound is the fall guy.

Digital Equipment Corp. plans to raise prices an average of 6% to 8% during the first six months of 1974, a spokesman said.

Data General Corp. is raising its prices 4% as a result of a periodic review of currency.

The increase will not affect DEC systems produced within the UK, but will cover equipment made in Ireland, including the PDP-8, PDP-11, reader/punches and the VT05 display, according to a report in *Computing*.

## Few UK Bureaus Making a Profit

LONDON - Few service bureaus here are operating at profit, a preliminary report by the Center for Interfirm Comparison (CIC) indicated.

Only five out of 11 bureaus surveyed operated profitably in the first six months of 1973, according to CIC.

### Performance Varied

Using operating profit or loss expressed as a percentage of total revenue as the performance indicator, the bureaus varied from a profit of 43.5% to a loss of 27.7%.

One small firm, which derives 77% of its revenue from computer use and 15% from programming, reported a profit of 8%, a proportion of its revenue, the CIC report stated.

A larger company, deriving 100% of its revenue from computer use, was the one reporting 43.5% for operating profit.

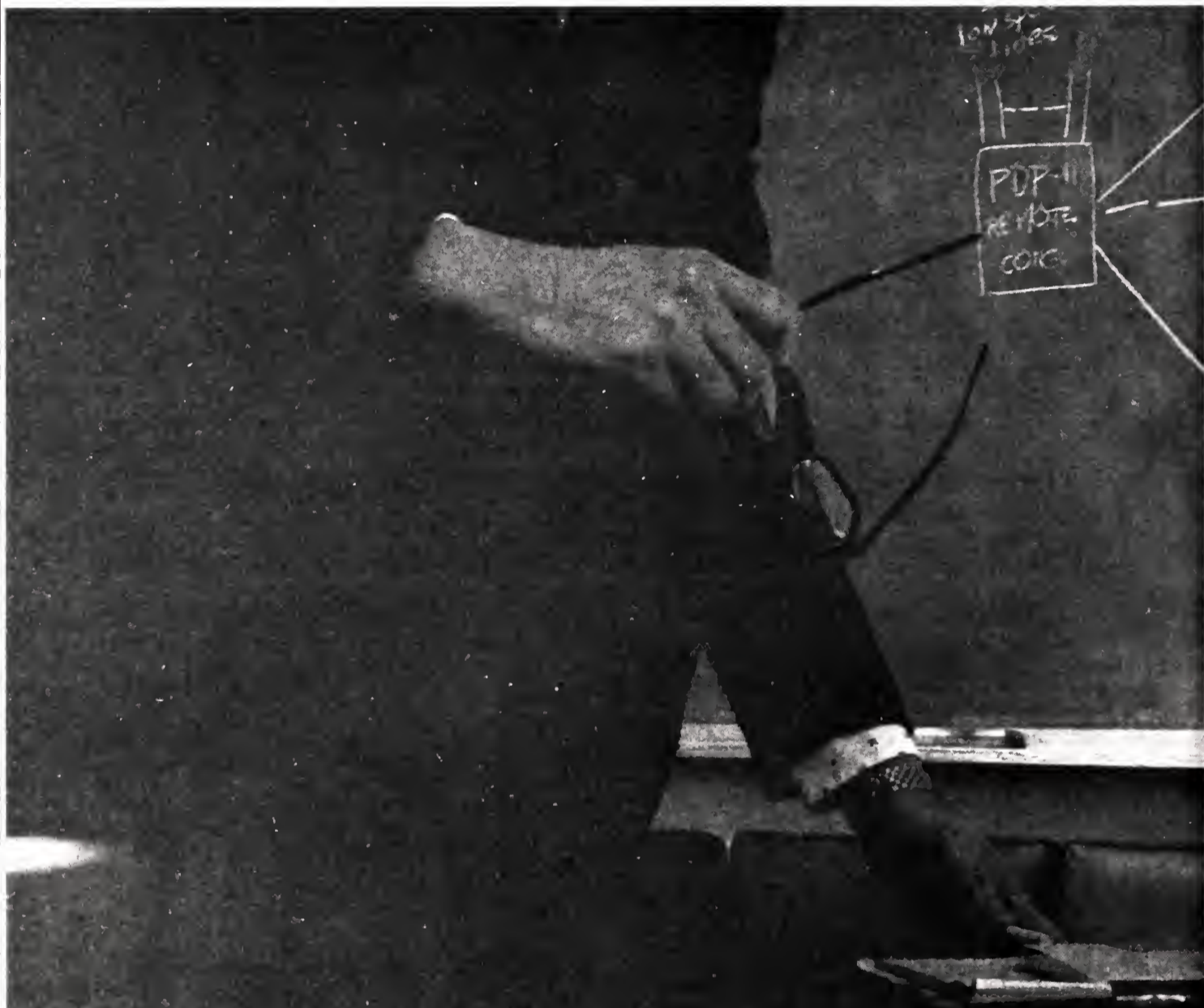
Another firm, combining reporting losses of 27.7%, gained only 60% of its revenue from computer use, the report indicated.

## Nixdorf Surveying Australian Market

SYDNEY, Australia - Nixdorf is spending some \$10,000 for an impartial survey of the operations and problems of the estimated 10,000 small businesses in Australia.

From this survey, Nixdorf hopes to pinpoint the market for its 820-15 visual recorder computer, according to the *Australian Financial Review*.

Nixdorf also hopes to get some publicity from the survey, since it feels it isn't widely enough known despite the fact that it's the first company to ever advertise on the back of Sydney buses.



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# High Oil Prices Forcing Japan to Increase Exports

TOKYO — Squeezed by the Arab oil price increases and pushed by increasing competition at home, Japanese computer makers are making increased efforts to export their gear — including the possibility of opening up U.S. marketing operations.

The doubling of the price for Arab oil is forcing Japan to pay out a large sum of cash (Japan relies on the Arab nations for 99.7% of its oil) which is causing problems in the balance of payments area, spurring the entire nation toward more aggressive exporting policies.

"Japan, which until recently was frowned upon by the U.S. and Western European nations because of massive dollar earnings through exports, will henceforth have to suffer a shortage of dollars, causing Japanese enterprises to resume their frantic efforts to boost exports," according to *EDP Japan Report*.

And while there is a major national drive on to increase exports across the board, there are several reasons the computer industry in particular will be expected to contribute to that effort, according to the publication.

First, competition is gaining in the Japanese computer market due to capital and import liberalization, limiting the growth domestically and forcing Japanese computer makers to export

## International News

in order to keep up their previous levels of profits and revenues, the report said.

Secondly, *EDP Japan Report* said, "Japanese-made computers, with the exception of super-sized computers, are fully com-

petitive with American and European products in both performance and price."

In addition, the study said Japanese makers are receiving a number of inquiries from foreign firms anxious to sell Japanese-made machines in the small- and medium-sized categories in foreign markets.

Today, exports account for a very small percentage of the computer market for Japanese products — amounting to only 1.6% of the total shipments during the first half of fiscal 1973 for the six Japanese manufacturers.

Among the six, the report noted, Fujitsu has been the most active in the export area, but added that its exports only accounted for 3.6% of its total production in the same time frame.

## UK Post Office Pact Goes to IBM

LONDON The Post Office here has awarded a \$5.5 million contract to IBM for a computer to be used in the Post Office's Middlesex center for research and development.

The contract, according to *Computer Weekly*, was expected to be awarded to British-owned ICL. A 1906S, which ICL had proposed, did not meet Post Office requirements for size or power, however, according to the British paper.

The contract is for a 370/168, with 3M bytes of memory, fast fixed-head disk, 8M bytes of replaceable disk storage and a 3705 communications controller.

The IBM machine will be used for R&D on the "System X" electronic telephone exchange. This will entail large-scale simulations and studies of telecommunications traffic and charging options.

The system will serve 70 simultaneous multitrace users, with the number of terminals eventually being increased to 200, *Computer Weekly* reported.

Present computing capabilities are being provided by two Burroughs B5500s, located at two centers. The Burroughs machines will continue to be used, although much of the work currently run on them will be phased over to the 370/168 as it becomes loaded, the paper said.

## ICL Order Rate Up

LONDON International Computers Ltd.'s orders are well ahead of last year, according to ICL Chairman Tom Hudson.

Hudson, speaking at ICL's annual meeting here, said the company has not experienced any change in order-taking rates.

Any difficulties the company has experienced have stemmed from the problems of obtaining raw materials and electronic components, rather than from national restrictions on working, according to general manager Geoffrey Cross.

ICL has formed two committees, one to mitigate the effects of energy shortages and one to seek "new opportunities for increasing profitable business."

## Foreign Orders & Installations

The Spanish Ministry of Finance has ordered a Univac 9480 system for accounting of public expenditure, control and development of the government's general budget and payments control.

The Imperial Chemical Co. of Slough, England, has installed Task/Master, a telecommunications monitor from Turnkey Systems, Inc., distributed by Hoskyns Systems Ltd.



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## Barclays Goes to CDC for Network

LONDON — Barclays Bank Ltd. has ordered three pairs of Control Data Corp. Cyber 1000 communications processors to be linked with IBM 360 and 370 CPUs as part of its data communications network, linking about 3,000 branch terminals to its three main data centers.

CDC will also provide the software in an order valued at \$4 million.

The Barclays DP centers primarily handle branch bank accounting but also process share registration, standing orders and the Barclaycard.

The network system will back up these services and provide intercomputer communication. Future applications could include on-line cash dispensing and point-of-sale accounting.

### Other Orders and Installations

University of the Pacific has installed a Burroughs B6700 replacing a B3500. The

system's applications will include a centralized on-line accounting system with CRTs, a data bank for permanent student records and remote job entry capability for the School of Dentistry in San Francisco.

### Orders & Installations

cisco, the McGeorge School of Law in Sacramento and the Pacific Marine Station in Dillon Beach.

Citadel Cement Corp. has ordered an LN5400 control system from Leeds & Northrup, utilizing two CP400 processors.

Santa Rosa Junior College has ordered an HP-3000 from Hewlett-Packard, which will be used primarily for instruction.

## Executive Corner

■ William R. Rummel has been named vice-president, computer leasing services, for Evergreen Computer and Financial, Inc., Minneapolis.

■ M.F. Eveleth Jr. has been elected president of Urban Data Processing, Inc., Arlington, Mass.

■ John A. Rollwagen has been appointed vice-president, marketing, of International Time-sharing Corp.

■ Infodata Systems, Inc. has announced four promotions: Robert Schreier to vice-president, Information Management Division; Harry Kaplowitz to vice-president, business development; Dr. Robert Loane to vice-president, Product and Systems Development Division; and William Hammond to vice-president, Information Services Division.

■ Daniel R. Young has been named executive vice-president and chief operat-

ing officer of Wyly Corp. John M. Scoree and E. Ray Cotton have been elected vice-presidents of the firm.

■ Alfred D. Delutis has joined Management Systems Corp. as vice-president, marketing.

■ George D. Roessler has been named a vice-president of Diva, Inc.

■ John W. Weil has been appointed to the new position of vice-president and chief technical officer of The Bendix Corporation. He joins Bendix from Honeywell Information Systems.

■ R.C. Mercure Jr. has been named chief executive and chairman of the executive committee of Tally Corp., replacing R.M. Ringo, who will remain a director.

■ Anthony J. Fennelli Jr. has been elected president and a director of Transport Data Communications, Inc.

# Who can sell computers in Japan? Shukan.

Shukan Computer is the Japanese computer and in English it means "Computer Weekly". Whatever you call it, Computerworld's new sister publication is an excellent vehicle for selling EDP products and services in the large and expanding Japanese EDP market. Here are some of the reasons why:

• **Shukan Computer** is a joint venture of *Computerworld* and Dempa Publications, the leading Japanese publisher of computer information services. With their combined resources of the two companies, Shukan has the largest news, advertising and circulation circulation in the world.

• **Shukan Computer** is the only new weekly for the fast-growing Japanese computer community.

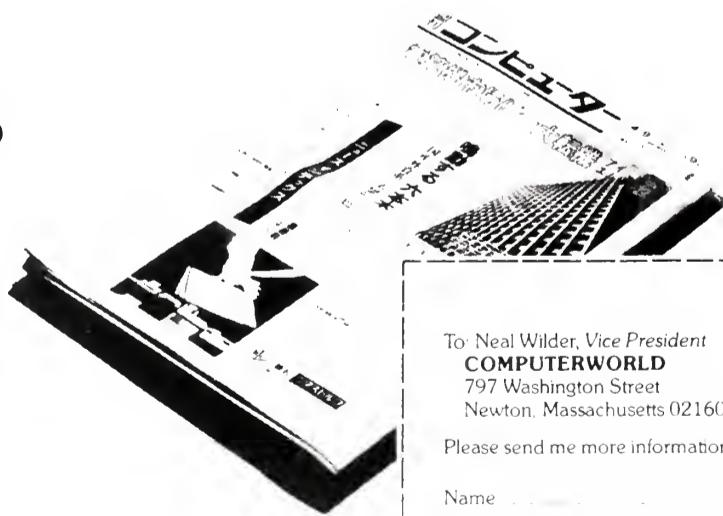
• **Shukan Computer** is a weekly that is directed about 80% to end users and 20% to computer industry. Computerworld's print methods currently allow you to use the same as the computer world the highest circulation rate for less than 10¢ per copy.

• **Shukan** is a joint venture of the world's largest EDP market. The Japanese Ministry of International Trade and Industry (MITI) has made the following 1974 forecast: 30,000 general purpose systems installed up from 11,247 in 1971; 11,000 minicomputers installed up from 1,671 in 1971; and 3,000 industrial systems installed up from 1,086 in 1971.

• **Shukan** is a weekly. The latest statistics of general purpose systems revealed that there were 13,800 systems installed as of September 1972, a one year increase of 3,500 units or 18.9% over 1971. The total value of these systems was \$1.7 billion and 2.1% respectively. And more than 70% of these systems were American made.

• **Shukan** is a weekly and an opportunity. But Japanese vendors and users must communicate in Japanese. Almost nothing they want and need. As a result, 1972 imports were \$1.5 billion.

• **Advertising in Shukan** is easy. With *Computerworld* representatives across the U.S. to assist you in using the space in Shukan. For a small fee, we can translate and insert your ad from English to Japanese. To get more facts, just send in the coupon.



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## Informatics, CSC Report Improved Third Quarters

Two West Coast software service firms — Informatics, Inc. and Computer Sciences Corp. — reported improved results in the third quarter.

Informatics reported a rise in earnings for the nine months ended December 29 to \$933,000 or 56 cents a share.

Earnings for the same period a year ago amounted to \$402,000 or 24 cents a share.

Revenues for the period were \$17 million compared with \$14.1 million in 1972.

Both years were restated to reflect the acquisition of SDA Corp. in June 1973.

Dr. Walter F. Bauer, president of Informatics, commented, "The significant rise in revenues reflects the continued strength of the computer software products and services business. The major areas of our business contributing to the favorable operating statement are Mark IV System sales and federal government contracts."

Computer Sciences had third-quarter earnings of \$698,000 or

5 cents a share in the period ended Dec. 28, compared with a loss of \$277,000 or 2 cents a share in the year-earlier period.

Revenues for the quarter rose to \$37.2 million compared with \$29.9 million a year ago.

Third-quarter earnings for the current fiscal year included a special credit of \$464,000 or 3 cents a share from the sale of CSC's investment in a \$9 million convertible debenture of Gilbert Associates, Inc., which it acquired as part of the proceeds from the sale of a subsidiary in February 1973.

For the nine months, earnings were \$1.1 million or 8 cents a share on revenues of \$107.1 million. In the like period last year, the company had a loss of \$2.1 million or 15 cents a share on revenues of \$85.1 million.

### Singer Earnings, Revenues Increase

NEW YORK Singer Co. reported earnings of \$31.5 million or \$1.67 a share in the fourth quarter, compared with \$31 million or \$1.65 a share a year ago.

Revenues rose to \$720.4 million from \$608.9 million, an 18% increase.

#### Record Year

For the year, Singer posted record earnings of \$94.5 million or \$5.05 a share, compared with \$87.5 million or \$4.60 a share last year.

Revenues increased 14% to a record \$2.53 billion from \$2.22 billion.

President Donald P. Kircher said high interest costs, plus the rising costs of materials and production problems associated with new products, limited earnings increases, especially in the fourth quarter.

## Acquisitions

Wilscam Enterprises (WE) has acquired Electronic Accounting, Inc. Jerry Ehrlich, president of Electronic Accounting, joins WE as DP manager.

Diva, Inc. has agreed to acquire Advanced Electronics Design, Inc. for an undisclosed amount.

American Management Systems, Inc. has acquired substantially all of the assets and business of National Information Systems Corp.'s Data Center, for \$465,000 in cash and notes.

National Micronetics, Inc. has acquired Pacific Micronetics through an exchange of stock of the two companies. Pacific will now operate as a wholly owned subsidiary of National.

American Hospital Supply Corp. has acquired the hospital division of Central Bank Computer Bureau for \$3.25 million.

Advanced Computer Techniques Corp. has acquired Creative Socio-Medies Corp. as a wholly owned subsidiary for \$200,000 in cash and ACF notes and 400,000 ACF common shares.

Cyberex, Inc. has acquired the assets of M-E-M Controls, Inc.

National Liberty Corp. and National Information Systems have agreed in principle to the merger of NIS with a new corporation to be jointly owned by NEC and Electronic Data Systems Corp.

Informatics, Inc. has agreed to acquire the assets of Parsons & William AG, Copenhagen, Denmark, for an undisclosed cash sum.

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## In Nine Months Telex Loses \$14.7 Million

TULSA, Okla. A third quarter loss of \$4.5 million brought Telex Corp.'s deficit for the nine months to \$14.7 million.

In the third quarter ended Dec. 31 revenues were \$24.9 million compared with \$26.5 million a year ago, when the firm earned \$862,000 or 8 cents a share.

Nine-month revenues totaled \$67.2 million, down slightly from \$67.5 million in the same period last year when Telex posted earnings of \$2.3 million or 22 cents a share.

President S.J. Jatrass said the

sales value of peripheral equipment placed in service for the quarter was \$14.7 million compared with \$27.6 million placed in service during the same quarter of 1972. In the nine months, the value was down to \$52.4 million from \$64 million.

### Rentals Up

Lease rental income for the quarter was up, however, to \$6.2 million from \$2.6, Jatrass added. Correspondingly, rental income in the nine-month period jumped to \$17.7 million from \$7.9 million.

## Wang Labs Posts Doubled Earnings, Revenues Rise 39% in Six Months

TEWKSBURY, Mass. Earnings at Wang Laboratories, Inc. more than doubled in the six months ended Dec. 31.

The company earned \$1.8 million or 45 cents a share in the

period, compared with \$718,755 or 18 cents a share a year ago.

Revenues were up to \$27.8 million, a 39% increase over \$20.1 million recorded last year.

In the quarter, earnings amounted to \$1 million or 25 cents a share, a 20% increase over \$835,381 or 21 cents a share in the same year-ago period.

Revenues rose 24% to \$14.9 million from \$12.1 million.

### 'Good Reception'

Dr. An Wang, company president, said the increased earnings and revenues were partly due to the "good reception and full-scale production of the new 2200 calculator-computer."

In addition, the Model 1200 word processing equipment continues to make progress and is becoming increasingly more profitable, he said.

Incoming orders for the second quarter were valued at about \$15.9 million, an increase of 39% over the same quarter a year ago.

Wang also noted that the company has reached an agreement with the First National Bank of Boston for a two-year revolving credit of \$12 million to finance customer receivables.

## Graham Reports Earnings Rise

GRAHAM, Texas. Graham Magnetics, Inc. reported earnings of \$602,368 or 64 cents a share for the first half ended Dec. 31, a 9.8% increase over the \$548,376 or 59 cents a share earned in the same year-ago period.

Last year's per-share figure was restated to reflect a 3% stock dividend paid in March 1973.

Revenues for the period rose 36% to \$7.3 million from \$5.4 million.

President G.A. Jagers said the earnings rise was affected by "much larger" charges against operations for research and development and sales promotion of new products. R&D charges were 78% higher this year than last, and a \$110,000 reserve was established in the period for extraordinary year-end expenses, he noted.

## ...Toward the Bottom Line

Datronic Rental expects lower earnings in future quarters due to "the current shortage of lending capital; high interest rates and extremely competitive conditions in the used computer leasing market." Lack of rentals on equipment whose leases have expired and remarketing of such equipment at lower rates to meet competition may adversely affect earnings, the firm said.

### \$\$\$

Computer Installations declared a semiannual cash dividend of five cents, to be paid Feb. 20 to stockholders of record Feb. 9.

### \$\$\$

Delayed introduction of the Documate II microfilmer, and increased material and labor costs were named as contributing factors in the first quarter loss at Terminal Data. The firm lost \$22,834 compared with earnings of \$106,371 in the same year-ago period.

### \$\$\$

Ampex expects earnings in the year ending April 28 to top \$1.1 million. The firm, which suffered an \$89.7 million loss in 1972, said it is ahead of schedule in repaying its debts and has sufficient cash flow for operations.

### \$\$\$

National CSS has accepted 227,793 common shares of TBS Computer Centers, for which it will pay \$9 per share. If other offers are accepted, NCSS will own over 93% of TBS's stock.

### \$\$\$

Datacraft shareholders will receive \$2.80 per share for their holdings as part of the terms of the merger of Datacraft into Harris-Intertype. Datacraft had been having cash flow problems.

### \$\$\$

The Palmer Organization has invested \$300,000 in Capidyne Systems Corp., Cambridge, Mass., a developer of DP systems for the textile and apparel industries.

### INCOMPLETE PLANNING



### INACCURATE TIME ESTIMATES



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### IMPRECISE STATUS INFORMATION



### UNRECOGNIZED TROUBLE AREAS



### DELAYED CORRECTIVE ACTION



# Earnings Reports

WANGO				COMPUTER DATA SYSTEMS			
Three Months Ended Dec. 31				Six Months Ended Dec. 31			
	1973	1972			1973	1972	
Shr Ernd	\$ .35	\$ .23		Shr Ernd	\$ .19	\$ .22	
Revenue	3,506,118	1,833,845		Revenue	1,596,600	984,300	
Tax Cred	.....	63,300		Tax Cred	.....	49,100	
Earnings	380,741	239,528		Earnings	98,700	115,800	

POTTER INSTRUMENT				MINI-COMPUTER SYSTEMS			
Six Months Ended Dec. 31				Year Ended Oct. 31			
	1973	1972			1973	1972	
Shr Ernd	\$ .59	\$ .12		Shr Ernd	\$ .41	\$ .13	
Revenue	26,563,393	24,294,708		Revenue	933,963	629,002	
Tax Cred	691,305	117,592		Tax Cred	90,000	15,000	
Earnings	1,623,431	366,524		Earnings	185,960	38,520	

CALIFORNIA COMPUTER PRODUCTS			
Three Months Ended Dec. 30			
	1973	1972	
Shr Ernd	\$ .77	\$ .25	
Revenue	31,358,000	20,479,000	
Tax Cred	1,083,000	.....	
Earnings	2,354,000	705,000	
6 Mo Shr	1.18	.....	
Revenue	57,041,000	33,471,000	
Tax Cred	1,620,000	.....	
Earnings	3,606,000	(1,578,000)	

ANDERSON JACOBSON			
Three Months Ended Dec. 31			
	1973	1972	
Shr Ernd	\$ .05	\$ .04	
Revenue	2,126,650	1,461,030	
Earnings	123,374	99,590	
9 Mo Shr	.13	.10	
Revenue	6,103,686	3,964,105	
Spec Cred	.....	336,964	
Earnings	323,431	262,284	

DECISION DATA COMPUTER			
Year Ended Dec. 1			
	1973	1972	
Revenue	\$18,461,000	\$3,396,000	
Loss	886,000	2,523,000	
3 Mo Shr	.01	.....	
Revenue	6,249,000	1,952,000	
Earnings	41,000	(570,000)	

ELECTRONIC DATA SYSTEMS			
Three Months Ended Dec. 31			
	1973	1972	
Shr Ernd	\$ .35	\$ .30	
Revenue	28,712,204	27,450,307	
Earnings	4,221,082	3,585,504	
6 Mo Shr	.68	.57	
Revenue	57,897,982	53,528,192	
Earnings	8,122,577	6,764,958	

INFORMATICS			
Nine Months Ended Dec. 29			
	1973	1972	
Shr Ernd	\$ .56	\$ .24	
Revenue	17,012,000	14,094,000	
Earnings	933,000	402,000	

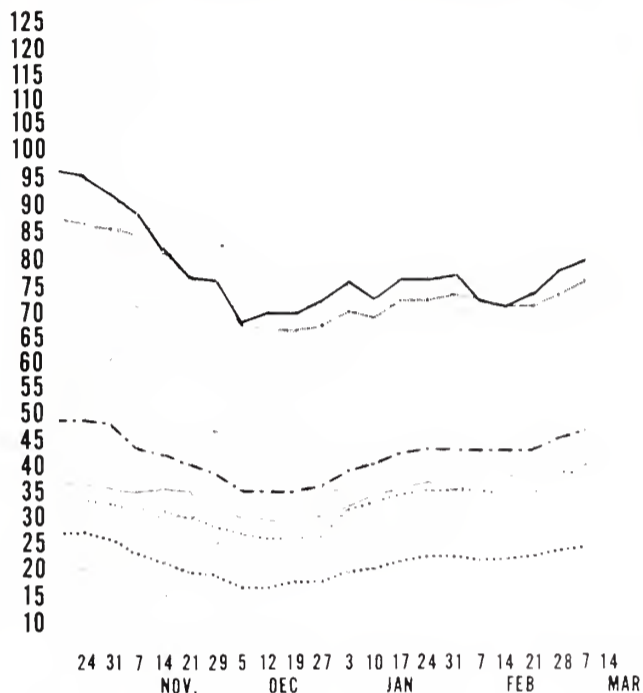
a-Restated to reflect the acquisition of SDA Corp. on a pooling-of-interests basis.

SINGER			
Year Ended Dec. 31			
	1973	1972	
(000)	(000)	(000)	
aShr Ernd	\$5.05	\$4.60	
Revenue	2,527,587	2,217,492	
Earnings	94,485	87,465	
a3 Mo Shr	1.67	1.65	
Revenue	720,407	608,943	
Earnings	31,489	30,972	

a-Fully diluted.

## COMPUTERWORLD Computer Stocks Trading Indexes

Computer Systems      Software & EDP Services  
 Peripherals & Subsystems      Leasing Companies  
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## The Computer Caravan welcomes:

**SCANDATA**

as an exhibitor in The Spring 1974 Caravan.

The newest member of the Scan-Data mixed media "family" - the 2250/2 Key Entry System - will be demonstrated. Representatives will describe the use of the 2250/2 in conjunction with the 2250/1 OCR System, and its use as a stand-alone second generation key-to-disk system.

The 2250/2 supports up to 32 SCAN-PLEX II Key Stations and offers unparalleled operating and programming flexibility, including the use of COBOL procedure statements.

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## Computerworld Stock Trading Summary

All statistics compiled, computed and formatted by  
**TRADE\*QUOTES, INC.**  
 Cambridge, Mass. 02139

PRICE							PRICE							PRICE									
F	X	C	H	1973-74	CLOSE	WEEK	WEEK	F	X	C	H	1973-74	CLOSE	WEEK	WEEK	F	X	C	H	1973-74	CLOSE	WEEK	WEEK
				RANGE	MAR 7	NET	PCT					RANGE	MAR 7	NET	PCT					RANGE	MAR 7	NET	PCT
COMPUTER SYSTEMS							SOFTWARE & EDP SERVICES							PERIPHERALS & SUBSYSTEMS									
N	SHRROUGHS CORP			175-252	207	+7	+3.5	O	ADVANCED COMP TECH			1- 2	1 1/8	-1/8	-10.0	O	ADVANCED COMP TECH			4- 74	10 5/8	+3/4	+7.5
N	COLLINS RADIO			16- 26	24 3/4	0	0.0	A	APPLIED DATA RES.			2- 4	2 1/8	+1/8	+6.2	O	ADVANCED MEMORY SYS			4- 23	5 1/2	+1/4	+4.7
O	COMPUTER AUTOMATION			5- 20	12	-1 3/8	-10.2	O	APPLIFLO LOGIC			1- 3	3/8	0	0.0	N	AMVEX CORP			3- 7	4 1/8	0	0.0
N	CONTROL DATA CORP			31- 62	35 7/8	-1 1/2	-4.0	N	AUTOMATIC DATA PHOC			19- 94	50	+3	+6.3	O	ANDERSON JACOBSON			2- 4	2 1/2	-1/4	-9.0
N	DATA GENERAL CORP			28- 49	36 7/8	+2 3/4	+8.0	O	BRANDON APPLIED SYST			1- 1	5/8	0	0.0	O	REFRESH MEDICAL ELEC			4- 10	5 1/4	-1/4	-4.5
O	DATAPoint CORP			10- 21	14	+3/4	+5.4	O	CENTRAL DATA SYSTEMS			3- 9	5 3/4	0	0.0	A	ROIT, REFRANEX & NEW			4- 12	8 1/4	-1/8	-1.4
O	DIGITAL COMP CONTROL			2- 6	2	+1/8	+6.6	O	COMPUTER DIMENSIONS			1- 5	2 5/8	+3/8	+16.6	N	RUNKER-HAM			6- 18	7 5/8	+1/4	+3.3
N	DIGITAL EQUIPMENT			73-118	114 1/4	-1 5/8	-1.4	O	COMPUTER HORIZONS			1- 4	3 1/2	-1/4	-6.6	A	CALCOMP			5- 16	9 3/8	-1/2	-5.0
N	ELECTRONIC ASSOC.			2- 9	3 1/8	+3/8	+13.4	O	COMPUTER NETWORK			1- 5	1 3/4	-1/8	-6.6	O	CAMPBIDGE MEMORIES			4- 17	12 3/8	+1/2	+4.2
A	ELECTRONIC ENGINEER.			6- 14	10 3/8	+1 3/8	+15.2	N	COMPUTER SCIENCES			2- 6	3 1/4	-1/8	-3.7	O	CENTRONICS DATA COMP			13- 38	18 3/4	-1	-5.0
N	FOXROD			23- 48	40 3/4	-3 1/8	-7.1	O	COMPUTER TASK GROUP			1- 2	5/8	0	0.0	O	CONFEX CORP			8- 19	13	+2 1/4	+20.9
O	GENERAL AUTOMATION			22- 55	31 3/4	+1 3/4	+5.4	O	COMPUTER TECHNOLOGY			1- 3	1/2	0	0.0	O	COGNITRONICS			1- 3	7/8	0	0.0
O	GRI COMPUTER CORP			1- 3	7/8	+1/8	+16.6	O	COMPUTER USAGE			3- 9	3 3/4	-1/8	-3.2								
N	HEWLETT-PACKARD CO			70- 99	83 1/8	+1 1/2	+1.8	O	COMPUSEC			1- 2	3/8	+1/8	+50.0								
N	HONEYWELL INC			68-139	74 1/2	-3/8	-0.5	O	COMSHARE			2- 9	3 1/4	-1/8	-3.7								
N	IRM			227-340	239 3/4	+1 7/8	+0.7	N	CORNUCA CORP			3- 15	3 1/2	0	0.0								
O	INTERDATA INC			7- 14	12 1/2	+1 3/4	+16.2	A	DATAR			1- 4	1 5/8	0	0.0								
O	MICRON DATA CORP			2- 10	3	-1/8	-4.0	A	ELECT COMP PROG			1- 2	1 1/4	+1/8	+100.0								
N	NCR			27- 44	38 1/2	+3/4	+1.4	N	ELECTRONIC DATA SYS.			13- 56	12 7/8	-2	-13.4								
N	RAYTHEON CO			22- 39	37 7/8	0	0.0	O	INFONATIONAL INC			1- 2	3/8	0	0.0								
N	SINGER CO			35- 74	35 1/4	-1 1/8	-3.0	O	INFORMATICS			2- 7	6 3/4	0	0.0								
N	SPEER RAND			36- 54	42 1/8	+1/4	+0.5	O	I.T.O.A. DATA CORP			1- 1	3/8	0	0.0								
A	SYSTEMS ENG. LARS			1- 8	2 1/8	+1/4	+13.3	O	IPS COMPUTER MARKET			1- 5	1 1/4	0	0.0								
N	TEXAS INSTRUMENTS			83-134	106 3/8	-2 1/2	-2.2	O	KEYDATA ASSOCIATES			2- 5	3 5/8	+1/2	+20.0								
O	ULTIMACC SYSTEMS INC			1- 11	1 1/4	0	0.0	O	KEYDATA CORP			4- 12	4 5/8	-1/8	-2.6								
N	VARIAN ASSOCIATES			10- 20	12 1/8	+7/8	+7.7	O	LOGICAN			2- 7	3 3/8	-1/8	-3.5								
N	WANG LABS.			13- 34	16 7/8	-1/3	-0.7	A	MANAGEMENT DATA			1- 5	1 1/2	+1/4	+9.0								
N	XEROX CORP			106-169	113 3/4	-1 1/4	-1.0	O	NATIONAL CSS INC			14- 42	34 1/2	+4	+13.1								
LEASING COMPANIES							PERIPHERALS & SUBSYSTEMS							SUPPLIES & ACCESSORIES									
A	ROTHMAN COMPUTER			1- 5	1 1/8	0	0.0	O	NATIONAL COMPUTER CO			1- 1	5/8	+1/8	+25.0	O	ALTIMORE BUS FORMS			4- 14	4 1/4	0	0.0
O	RPS/SHAW COMP.			1- 2	2	0	0.0	O	NATIONAL INFO SVCS			1- 2	1/4	0	0.0	A	BARNEY BRIGHT			4- 13	4	+1/8	+2.1
O	COMISCO INC			4- 17	5 1/2	0	0.0	P	ON LINE SYSTEMS INC			12- 29	28 1/2	+3 3/8	+13.4	O	CYBERNETICS INC			1- 3	1 1/4	+1/8	+11.1
O	COMMERCIAL GROUP CORP			3- 6	5	-7/8	-14.8	N	PLANNING RESEARCH			2- 7	2 7/8	-1/4	-8.0	A	DATA DOCUMENTS			17- 30	29 1/2	-1/4	-0.8
O	COMPUTER EXCHANGE			1- 1	1/4	0	0.0	O	PROGRAMMING METHODS			17- 25	17	0	0.0	O	EMULEX PERIPHERALS INC			4- 11	4 5/8	-1/8	-1.4
A	COMPUTER INVESTS GRP			2- 9	3 1/4	0	0.0	O	PROTECH INC			3- 24	2 5/8	-1/8	-4.5	N	EMULEX BUS. FORMS			8- 0	6 1/2	+3/8	+6.1
O	COMP. INSTALLATIONS			1- 2	1/4	-3/4	-75.0	O	SCIENTIFIC COMPUTERS			1- 3	5/8	-1/8	-16.6	O	GRANHAM MAGNETICS			7- 20	6 1/2	-1/4	-2.8
M	DATRONIC RENTAL			1- 3	2	0	0.0	O	SIMPLICITY COMPUTER			1- 4	1	0	0.0	O	GRAPHIC CONTROLS			7- 13	5	+1/2	+6.8
A	DCL INC			0- 3	3/4	+1/8	+20.0	O	TCS COMPUTER CENTERS			2- 9	8 1/2	0	0.0	N	IBM COMPANY			4- 19	76 5/8	-1/8	-0.1
A	DEARBORN-STORM			12- 26	15	-1	-6.2	O	TCC INC			1- 1	1/4	-1/8	-33.3	O	MOORE CORP LTD			4- 40	52 1/2	-1 1/2	-2.7
N	DPF INC			3- 9	4 1/2	-1/4	-2.7	O	TYNSHARE INC			6- 13	10 1/8	+1 1/4	+14.0	N	NISHIDA CORP			3- 5	4	+5/8	+1.5
O	FOR RESOURCES			1- 3	3 1/4	0	0.0	O	UNITED DATA CENTER			3- 4	3 1/2	0	0.0	O	PERKINS & WYNOLD			2- 5	24	+1 1/2	+1.0
A	GRANITE MGT			2- 6	2 1/2	0	0.0	A	URS SYSTEMS			2- 8	3 1/4	+1/8	+4.1	O	STANDARD REGISTER			11- 20	14 1/4	+1/4	+1.7
A	GREYHOUND COMPUTEP			3- 6	4 1/4	-1/4	-5.5	N	WYLY CORP			3- 11	4	+1/8	+3.2	O	TBR PRODUCTS CO			7- 23	7	0	0.0
A	ITEL			4- 12	5	0	0.0																
N	LEASCO CORP			8- 18	11 3/4	+1 5/8	+16.0																
O	LEASPAC CORP			1- 4	1 1/4	0	0.0																
O	LECTRO MGT INC			1- 2	3/8	0	0.0																
O	NPG INC			3- 15	4 1/2	+1/4	+5.8																
A	RIORTEX TEX CORP			4- 8	3 3/4	-1/4	-6.2																
A	ROCKWOOD COMPUTER			1- 3	1	0	0.0																
N	U.S. LEASING			16- 36	21 3/4	-1/2	-2.2																
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